

# EXHIBIT 7

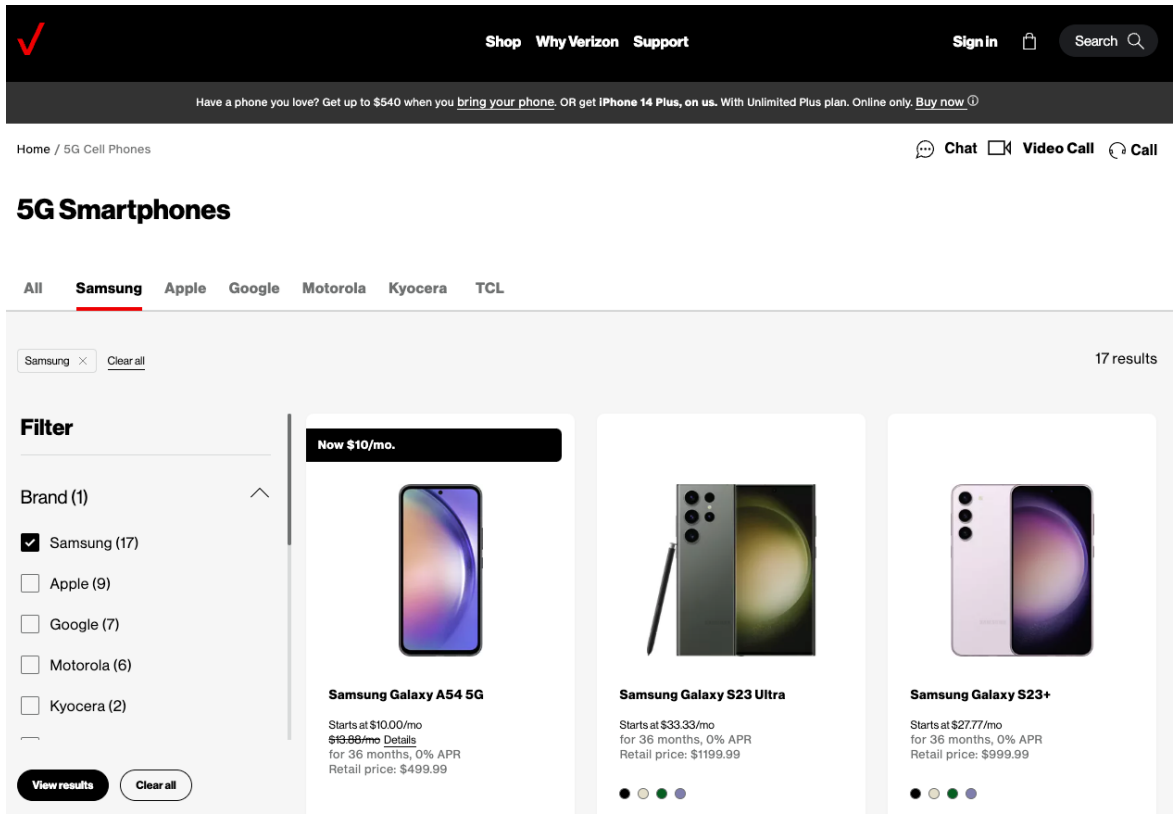
**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY****Exhibit B - U.S. Patent No. 8,589,541 (“’541 Patent”)**

Accused Instrumentalities: smartphones, basic phones, tablets, laptops, and hotspot devices sold (including those sold in bundles with data plans) or used by Verizon and all versions and variations thereof (“Accused Instrumentalities”) since the issuance of U.S. Pat. No. 8,589,541 (the “Asserted Patent”).

**Claim 1**

| Claim  | Public Documentation  |
|--|---|
| [1a] A non-transitory computer-readable storage medium storing machine-executable instructions that, when executed by one or more processors of a wireless end-user device, cause the one or more processors to: | <p>The Accused Instrumentalities include “A non-transitory computer-readable storage medium storing machine-executable instructions that, when executed by one or more processors of a wireless end-user device, cause the one or more processors to.”</p> <p>For example, Verizon sells and uses devices described by Verizon’s website below (e.g., devices made by Samsung, Apple, Motorola, Google, and Kyocera). These devices constitute a wireless end-user device as described in claim 1. <i>See, e.g.</i>: <a href="https://www.verizon.com/shop/online/5g-cell-phones/samsung/">https://www.verizon.com/shop/online/5g-cell-phones/samsung/</a>:</p> |

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| Claim | Public Documentation   |
|-------|--|
|       |  <p>As a specific example, Samsung Galaxy S22 is a wireless end-user device which runs the Android Operating System. <i>See, e.g.</i>, <a href="https://www.verizon.com/smartphones/samsung-galaxy-s22/">https://www.verizon.com/smartphones/samsung-galaxy-s22/</a>:</p> |

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**Performance**

**Bluetooth**

Y, BT 5.2

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**Processor**

Snapdragon 8 Gen 1 Mobile Platform, Octa-Core, 2.99GHz, 2.4GHz, 1.7GHz

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**Storage**

128GB/256GB (ROM) + 8GB (RAM)

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**OS**

Android 12 (S OS)

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**Expandable Memory**

No

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**Hotspot**

Y, (3G : 5 devices, 4G/5G : 10 devices)

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



























**Security**

Fingerprint, face lock

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| Claim           | Public Documentation   |   |  |  |  |           |   |   |   |             |   |  |  |
|-----------------|--|---|--|--|--|-----------|---|---|---|-------------|---|--|--|
|                 | <p>Verizon sells smartphones on <a href="https://www.verizon.com/smartphones">https://www.verizon.com/smartphones</a>.<br/>Verizon sells “basic” phones on <a href="https://www.verizon.com/basic-phones">https://www.verizon.com/basic-phones</a>.<br/>Verizon sells hotspot devices on <a href="https://www.verizon.com/internet-devices">https://www.verizon.com/internet-devices</a>.<br/>Verizon sells laptops and tablets on <a href="https://www.verizon.com/tablets">https://www.verizon.com/tablets</a>.</p> <p>For further example, the Samsung Galaxy S22 model is sold or used by Verizon and includes 8GB RAM and either 128GB or 256GB non-removable memory storage, in which control policies for applications are stored. <i>See, e.g.,</i> <a href="https://www.samsung.com/us/smartphones/galaxy-s22/buy/galaxy-s22-128gb-unlocked-sm-s901uzkaxaa/">https://www.samsung.com/us/smartphones/galaxy-s22/buy/galaxy-s22-128gb-unlocked-sm-s901uzkaxaa/</a>:</p> <div><table><tr><td>Storage Options</td><td><br/>128GB   256GB   512GB   1TB</td><td><br/>128GB   256GB</td><td><br/>128GB   256GB</td></tr><tr><td>Processor</td><td><br/>Snapdragon 8 Gen 1</td><td><br/>Snapdragon 8 Gen 1</td><td><br/>Snapdragon 8 Gen 1</td></tr><tr><td>RAM Options</td><td><br/>8GB   12GB</td><td><br/>8GB</td><td><br/>8GB</td></tr></table></div> <p>For further example, the Galaxy S22 has either a Snapdragon (in the United States) or Exynos (in Korea) architecture-based application processor. <i>See, e.g.,</i> <a href="https://www.samsung.com/us/smartphones/galaxy-s22/buy/galaxy-s22-128gb-unlocked-sm-s901uzkaxaa/">https://www.samsung.com/us/smartphones/galaxy-s22/buy/galaxy-s22-128gb-unlocked-sm-s901uzkaxaa/</a>:</p> <div><br/>Snapdragon 8 Gen 1</div> | Storage Options   | <br>128GB   256GB   512GB   1TB | <br>128GB   256GB | <br>128GB   256GB | Processor | <br>Snapdragon 8 Gen 1 | <br>Snapdragon 8 Gen 1 | <br>Snapdragon 8 Gen 1 | RAM Options | <br>8GB   12GB | <br>8GB | <br>8GB |
| Storage Options | <br>128GB   256GB   512GB   1TB   | <br>128GB   256GB      | <br>128GB   256GB             |  |  |           |   |   |   |             |   |  |  |
| Processor       | <br>Snapdragon 8 Gen 1  | <br>Snapdragon 8 Gen 1 | <br>Snapdragon 8 Gen 1        |  |  |           |   |   |   |             |   |  |  |
| RAM Options     | <br>8GB   12GB  | <br>8GB                | <br>8GB                       |  |  |           |   |   |   |             |   |  |  |

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| Claim   | Public Documentation  |
|---|---|
|   | <p><i>See also, e.g.,</i> VZN-HW0000220 (and the Verizon requirements plans/documents referenced therein, as well as similar Verizon Requirement Plan(s), e.g., VZN-HW0177206; VZN-HW0175764; VZN-HW0177547; VZN-HW0175706; VZN-HW0176298; VZN-HW0174414; VZN-HW0175852; VZN-HW0175684; VZN-HW0175615; VZN-HW0177896; VZN-HW0174579; VZN-HW0176039; VZN-HW0176619; VZN-HW0175530; VZN-HW0174481; VZN-HW0176225; VZN-HW0174810; VZN-HW0177800; VZN-HW0174672; VZN-HW0175151; VZN-HW0176639; VZN-HW0174543; VZN-HW0175659; VZN-HW0176530; VZN-HW0174593; VZN-HW0178394; VZN-HW0174828; VZN-HW0175450; VZN-HW0176204; VZN-HW0176982; VZN-HW0176005; VZN-HW0175549; VZN-HW0178430; VZN-HW0176958; VZN-HW0178438; VZN-HW0176578; VZN-HW0176348; VZN-HW0175719; VZN-HW0176376; VZN-HW0175638; VZN-HW0173989; VZN-HW0168826; VZN-HW0172610; VZN-HW0170830; VZN-HW0170123; VZN-HW0170020; VZN-HW0176096; VZN-HW0173579; VZN-HW0168055; VZN-HW0173207; VZN-HW0175801; VZN-HW0171292; VZN-HW0176404; VZN-HW0169708; VZN-HW0174711; VZN-HW0171041; VZN-HW0168438; VZN-HW0169144; VZN-HW0171034; VZN-HW0176253; VZN-HW0168937; VZN-HW0178208; VZN-HW0168214; VZN-HW0177919; VZN-HW0177231; VZN-HW0170855; VZN-HW0173155; VZN-HW0169753; VZN-HW0172836; VZN-HW0178369; VZN-HW0175490; VZN-HW0170876; VZN-HW0173388; VZN-HW0175252; VZN-HW0171269; VZN-HW0177977; VZN-HW0170140; VZN-HW0171240; VZN-HW0171064; VZN-HW0171315; VZN-HW0173181; VZN-HW0168426; VZN-HW0171251; VZN-HW0177620; VZN-HW0168225; VZN-HW0177024; VZN-HW0174394; VZN-HW0176581; VZN-HW0173422; VZN-HW0171072; VZN-HW0173513; VZN-HW0174896; VZN-HW0173177; VZN-HW0168888; VZN-HW0173571; VZN-HW0168293; VZN-HW0172626; VZN-HW0168153; VZN-HW0168467; VZN-HW0172868; VZN-HW0169975; VZN-HW0176672; VZN-HW0173107; VZN-HW0169867; VZN-HW0169801; VZN-HW0170042; VZN-HW0169032; VZN-HW0172889; VZN-HW0172906; VZN-HW0174107; VZN-HW0169470; VZN-HW0168191; VZN-HW0168925; VZN-HW0168092; VZN-HW0172748; VZN-HW0172440; VZN-HW0174270; VZN-HW0172200; VZN-HW0168510; VZN-HW0173610; VZN-HW0173815; VZN-HW0170808; VZN-HW0172082; VZN-HW0173375; VZN-HW0168759; VZN-HW0171739; VZN-HW0168541; VZN-HW0169588; VZN-HW0170882; VZN-HW0172312; VZN-HW0171091; VZN-HW0173217; VZN-HW0169926; VZN-HW0169149; VZN-HW0170627; VZN-HW0170151; VZN-HW0171347).</p> |
| [1b] identify a service usage activity of the wireless end-user device, | The Accused Instrumentalities “identify a service usage activity of the wireless end-user device, the service usage activity being associated with a first software component of a plurality of software components on the  |

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| Claim  | Public Documentation   |
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| the service usage activity being associated with a first software component of a plurality of software components on the wireless end-user device, the service usage activity comprising one or more prospective or successful communications over a wireless network; | <p>wireless end-user device, the service usage activity comprising one or more prospective or successful communications over a wireless network.”</p> <p>For example, Samsung’s devices, including the Samsung Galaxy S22, run the Android Operating System, which includes features such as “Data Saver,” or “Power Saver,” “Doze Mode,” “App Standby,” “Adaptive Battery,” and/or “JobScheduler” features apply to at least some service usage activities associated with a software component comprising prospective or successful communications over a wireless network. <i>See, e.g.</i>, <a href="https://www.verizon.com/smartphones/samsung-galaxy-s22/">https://www.verizon.com/smartphones/samsung-galaxy-s22/</a>:</p> |

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**Performance**

**Bluetooth**

Y, BT 5.2

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**Processor**

Snapdragon 8 Gen 1 Mobile Platform, Octa-Core, 2.99GHz, 2.4GHz, 1.7GHz

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**Storage**

128GB/256GB (ROM) + 8GB (RAM)

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**OS**

Android 12 (S OS)

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**Expandable Memory**

No

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**Hotspot**

Y, (3G : 5 devices, 4G/5G : 10 devices)





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**Security**

Fingerprint, face lock

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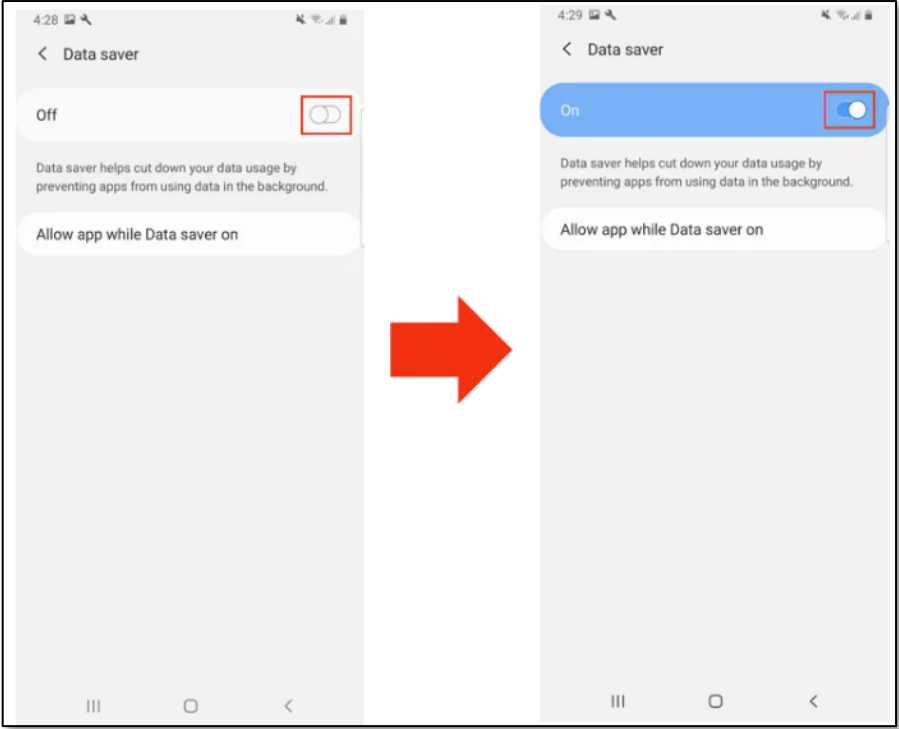
**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

| Claim | Public Documentation  |
|-------|---|
|       | <p><a href="https://www.verizon.com/support/knowledge-base-236117/">https://www.verizon.com/support/knowledge-base-236117/</a>:</p> <div> <h2>Samsung Galaxy S21 5G / Galaxy S21 Ultra 5G - Manage Data Usage</h2> <div>NOTE</div> <ul style="list-style-type: none"> <li>• Data usage info provided by the device may differ from actual usage. For data usage info provided by Verizon, refer to the <a href="#">My Verizon website</a>.</li> <li>•  For a better understanding of how data is used, check out this <a href="#">video</a>.</li> <li>• To control data usage on your account, refer to <a href="#">Verizon Smart Family™</a>.</li> </ul> <ol style="list-style-type: none"> <li>1. From a Home screen, swipe up from the center of the display to access the apps screen.<br/>→ These instructions only apply to <a href="#">Standard mode</a> and the default <a href="#">Home screen layout</a>.</li> <li>2. Navigate: <b>Settings</b>  <b>Connections</b>.</li> <li>3. Tap <b>Data usage</b> then do any of the following: <ul style="list-style-type: none"> <li>• Turn Data saver off <ol style="list-style-type: none"> <li>a. Tap <b>Data saver</b>.</li> <li>b. Tap the Data saver switch to turn on  or off  .<br/>→ Data saver must be turned off to use Mobile Hotspot.</li> </ol> </li> </ul> </li> </ol> </div> <p>; <a href="https://www.samsung.com/us/support/answer/ANS00079018/">https://www.samsung.com/us/support/answer/ANS00079018/</a>:</p> |

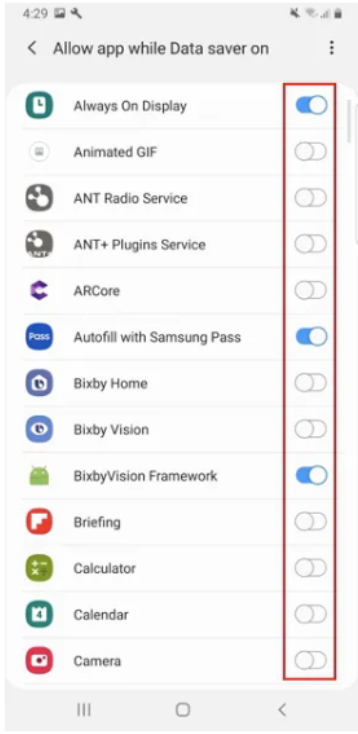
**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

| Claim | Public Documentation   |
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|       | <div><div><div><div>Turn Data saver on or off</div><div><p>Data saver prevents some apps from sending or receiving data in the background. So rest assured, you're not wasting any precious data.</p><ol style="list-style-type: none"><li>1. Navigate to and open <b>Settings</b>, and then tap <b>Connections</b>.</li><li>2. Tap <b>Data usage</b>, tap <b>Data saver</b>, and then tap the <b>switch</b> next to Turn on now.</li><li>3. If there are still some apps you'd like to run in the background, you can set them as exceptions. Tap <b>Allowed to use data while Data saver is on</b> at the bottom of the screen.</li><li>4. Tap <b>More options</b> (the three vertical dots) and choose <b>Show system apps</b> or <b>Show allowed apps first</b> to narrow down the list.</li><li>5. Finally, tap the <b>switch(es)</b> next to your desired app(s).</li></ol></div><div></div></div></div><div><p>; <a href="https://www.samsung.com/ae/support/mobile-devices/android-pie-what-is-the-data-saver-feature/">https://www.samsung.com/ae/support/mobile-devices/android-pie-what-is-the-data-saver-feature/</a>;</p></div></div> |

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**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

| Claim | Public Documentation  |
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|       | <div><p>6 Toggle the switches on next to the apps that you need to receive notifications from all the time. Email, Messages, Messenger, Instagram and Facebook are all popular options to allow unrestricted data access..</p><p>The screenshot shows the 'Allow app while Data saver on' settings page. It lists various system and app services with toggle switches. A red rectangular box highlights the switches for 'Always On Display', 'Bixby Vision Framework', and 'Camera', which are currently turned on. Other services like 'Animated GIF', 'ANT Radio Service', 'ANT+ Plugins Service', 'ARCore', 'Autofill with Samsung Pass', 'Bixby Home', 'Bixby Vision', 'Briefing', 'Calculator', and 'Calendar' have their switches turned off.</p><p>; <a href="https://www.samsung.com/us/support/answer/ANS00078987/">https://www.samsung.com/us/support/answer/ANS00078987/</a>:</p></div> |




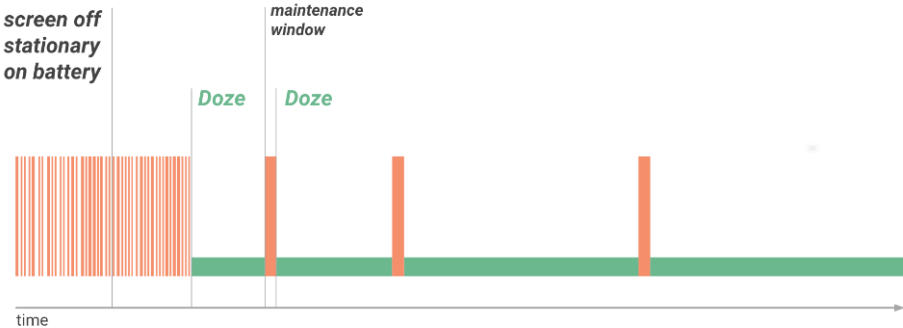
**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

| Claim | Public Documentation   |
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|       | <div><div><div><div>Power saving mode</div><div><p><b>Note:</b> Using Power saving mode can affect app and device performance. Some tasks and features may take longer to complete or update. Additionally, apps running in the background may not receive updates or send you notifications when Power saving mode is enabled.</p><p>Before you turn in for the night, change your phone's power mode. This will decrease your phone's performance and save battery life.</p><ol style="list-style-type: none"><li>1. Navigate to and open <b>Settings</b>, and then tap <b>Battery and device care</b>.</li><li>2. Tap <b>Battery</b>, and then tap <b>Power saving</b>.</li><li>3. Tap the <b>switches</b> next to your desired settings or customizations.</li><li>4. Finally, tap the <b>switch</b> at the top of the screen to activate Power saving mode.</li></ol><p>You will not be able to adjust the settings once the mode is enabled. If you want to change any of the settings, you'll need to temporarily disable Power saving mode.</p></div><div><div>Power saving options</div><div>Choose additional limits to save battery when Power saving mode is on.</div><div><div>Turn off Always On Display</div><div>Limit CPU speed to 70%</div><div>Decrease brightness by 10%</div></div></div></div></div><div><p>; <a href="https://developer.android.com/training/basics/network-ops/data-saver">https://developer.android.com/training/basics/network-ops/data-saver</a>:</p><div><div><div>Optimize network data usage</div><div><p>Over the life of a smartphone, the cost of a cellular data plan can easily exceed the cost of the device itself. On Android 7.0 (API level 24) and higher, users can enable Data Saver on a device-wide basis in order to optimize their device's data usage, and use less data. This ability is especially useful when roaming, near the end of the billing cycle, or for a small prepaid data pack.</p><p>When a user enables Data Saver in <b>Settings</b> and the device is on a metered network, the system blocks background data usage and signals apps to use less data in the foreground wherever possible. Users can allow specific apps to use background metered data usage even when Data Saver is turned on.</p><p>Android 7.0 (API level 24) extends the <code>ConnectivityManager</code> API to provide apps with a way to <a href="#">retrieve the user's Data Saver preferences</a> and <a href="#">monitor preference changes</a>. It is considered good practice for apps to check whether the user has enabled Data Saver and make an effort to limit foreground and background data usage.</p></div></div></div></div></div> |

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|       | <div><p><b>Check data saver preferences</b></p><p>On Android 7.0 (API level 24) and higher, apps can use the <code>ConnectivityManager</code> API to determine what data usage restrictions are being applied. The <code>getRestrictBackgroundStatus()</code> method returns one of the following values:</p><p><code>RESTRICT_BACKGROUND_STATUS_DISABLED</code></p><p>Data Saver is disabled.</p><p><code>RESTRICT_BACKGROUND_STATUS_ENABLED</code></p><p>The user has enabled Data Saver for this app. Apps should make an effort to limit data usage in the foreground and gracefully handle restrictions to background data usage.</p><p><code>RESTRICT_BACKGROUND_STATUS_WHITELISTED</code></p><p>The user has enabled Data Saver but the app is allowed to bypass it. Apps should still make an effort to limit foreground and background data usage.</p><p>Limit data usage whenever the device is connected to a metered network, even if Data Saver is disabled or the app is allowed to bypass it. The following sample code uses <code>ConnectivityManager.isActiveNetworkMetered()</code> and <code>ConnectivityManager.getRestrictBackgroundStatus()</code> to determine how much data the app should use:</p></div> <p>; <a href="https://developer.android.com/training/monitoring-device-state/doze-standby">https://developer.android.com/training/monitoring-device-state/doze-standby</a>;</p> |

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|       | <div><h2>Optimize for Doze and App Standby </h2><p>Starting from Android 6.0 (API level 23), Android introduces two power-saving features that extend battery life for users by managing how apps behave when a device is not connected to a power source. <i>Doze</i> reduces battery consumption by deferring background CPU and network activity for apps when the device is unused for long periods of time. <i>App Standby</i> defers background network activity for apps with which the user has not recently interacted.</p><p>While the device is in Doze, apps' access to certain battery-intensive resources is deferred until maintenance windows. The specific restrictions are listed in <a href="#">Power Management Restrictions</a>.</p><p>Doze and App Standby manage the behavior of all apps running on Android 6.0 or higher, regardless whether they are specifically targeting API level 23. To ensure the best experience for users, test your app in Doze and App Standby modes and make any necessary adjustments to your code. The sections below provide details.</p></div> <div><h3>Understanding Doze</h3><p>If a user leaves a device unplugged and stationary for a period of time, with the screen off, the device enters Doze mode. In Doze mode, the system attempts to conserve battery by restricting apps' access to network and CPU-intensive services. It also prevents apps from accessing the network and defers their jobs, syncs, and standard alarms.</p><p>Periodically, the system exits Doze for a brief time to let apps complete their deferred activities. During this <i>maintenance window</i>, the system runs all pending syncs, jobs, and alarms, and lets apps access the network.</p><p><b>Figure 1.</b> Doze provides a recurring maintenance window for apps to use the network and handle pending activities.</p></div> |

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|       | <div>At the conclusion of each maintenance window, the system again enters Doze, suspending network access and deferring jobs, syncs, and alarms. Over time, the system schedules maintenance windows less and less frequently, helping to reduce battery consumption in cases of longer-term inactivity when the device is not connected to a charger.</div> <div>As soon as the user wakes the device by moving it, turning on the screen, or connecting a charger, the system exits Doze and all apps return to normal activity.</div> <div>The Doze restriction on network access is also likely to affect your app, especially if the app relies on real-time messages such as tickles or notifications. If your app requires a persistent connection to the network to receive messages, you should use <a href="#">Firebase Cloud Messaging (FCM)</a> if possible.</div> <div>; <a href="https://developer.android.com/topic/performance/appstandby">https://developer.android.com/topic/performance/appstandby</a>:</div> |

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## App Standby Buckets

Android 9 (API level 28) and higher support **App Standby Buckets**. App Standby Buckets help the system prioritize apps' requests for resources based on how recently and how frequently the apps are used. Based on app usage patterns, each app is placed in one of five priority **buckets**. The system limits the device resources available to each app based on which bucket the app is in.

### Priority buckets

The system dynamically assigns each app to a priority bucket, reassigning the apps as needed. The system may rely on a preloaded app that uses machine learning to determine how likely each app is to be used, and assigns apps to the appropriate buckets. If the system app is not present on a device, the system defaults to sorting apps based on how recently they were used. More active apps are assigned to buckets that give the apps higher priority, making more system resources available to the app. In particular, the bucket determines how frequently the app's jobs run, and how often the app can trigger alarms. These restrictions apply only while the device is on battery power; the system does not impose these restrictions on apps while the device is charging.

★ **Note:** Every manufacturer can set their own criteria for how non-active apps are assigned to buckets. You should not try to influence which bucket your app is assigned to. Instead, focus on making sure your app behaves well in whatever bucket it might be in. Your app can find out what bucket it's currently in by calling [`UsageStatsManager.getAppStandbyBucket\(\)`](#).

The buckets are:

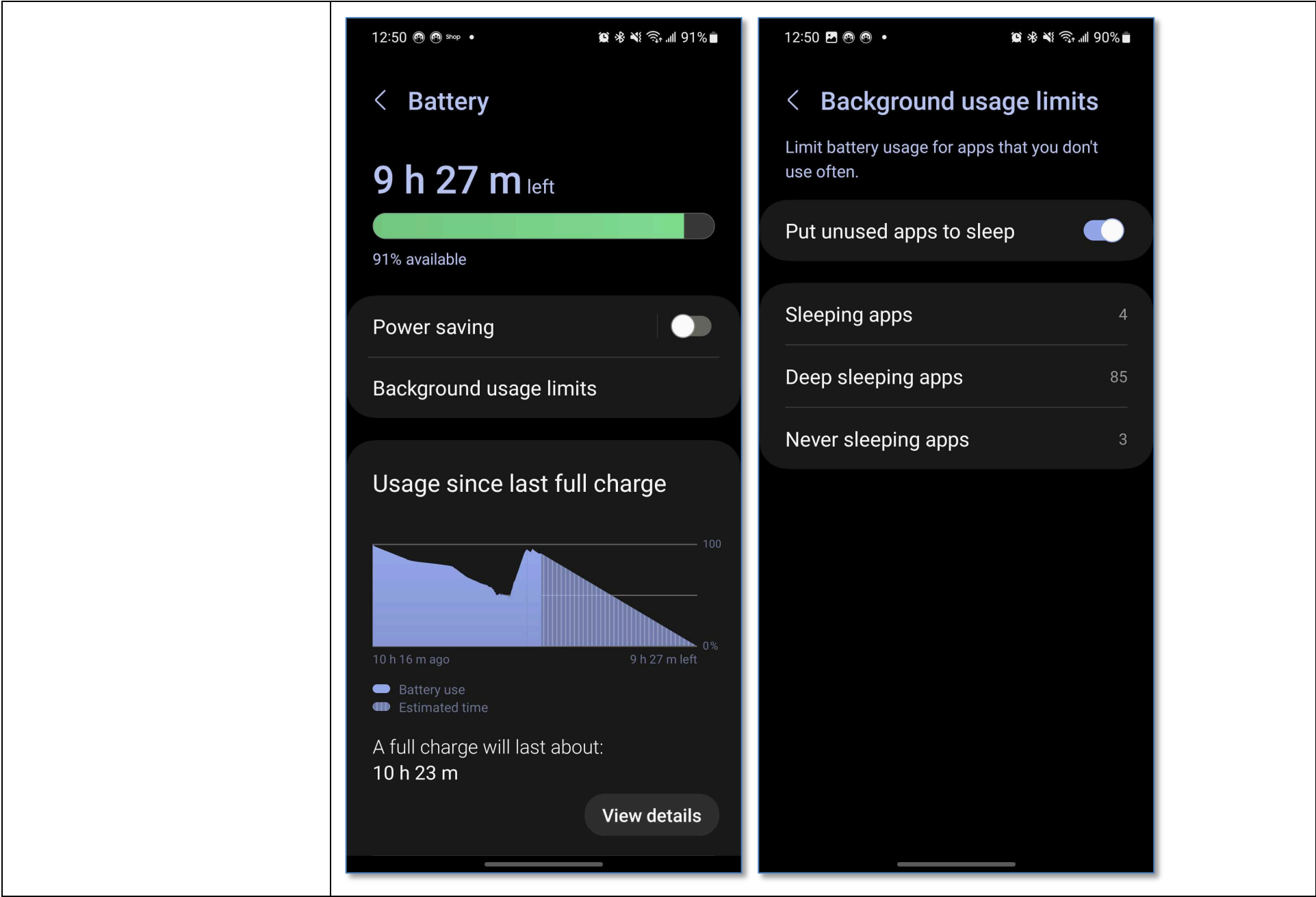
1. **Active:** App is currently being used or was very recently used.
2. **Working set:** App is in regular use.
3. **Frequent:** App is often used, but not every day.
4. **Rare:** App is not frequently used.
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In addition, there's a special **never** bucket for apps that have been installed but have never been run. The system imposes severe restrictions on these apps.

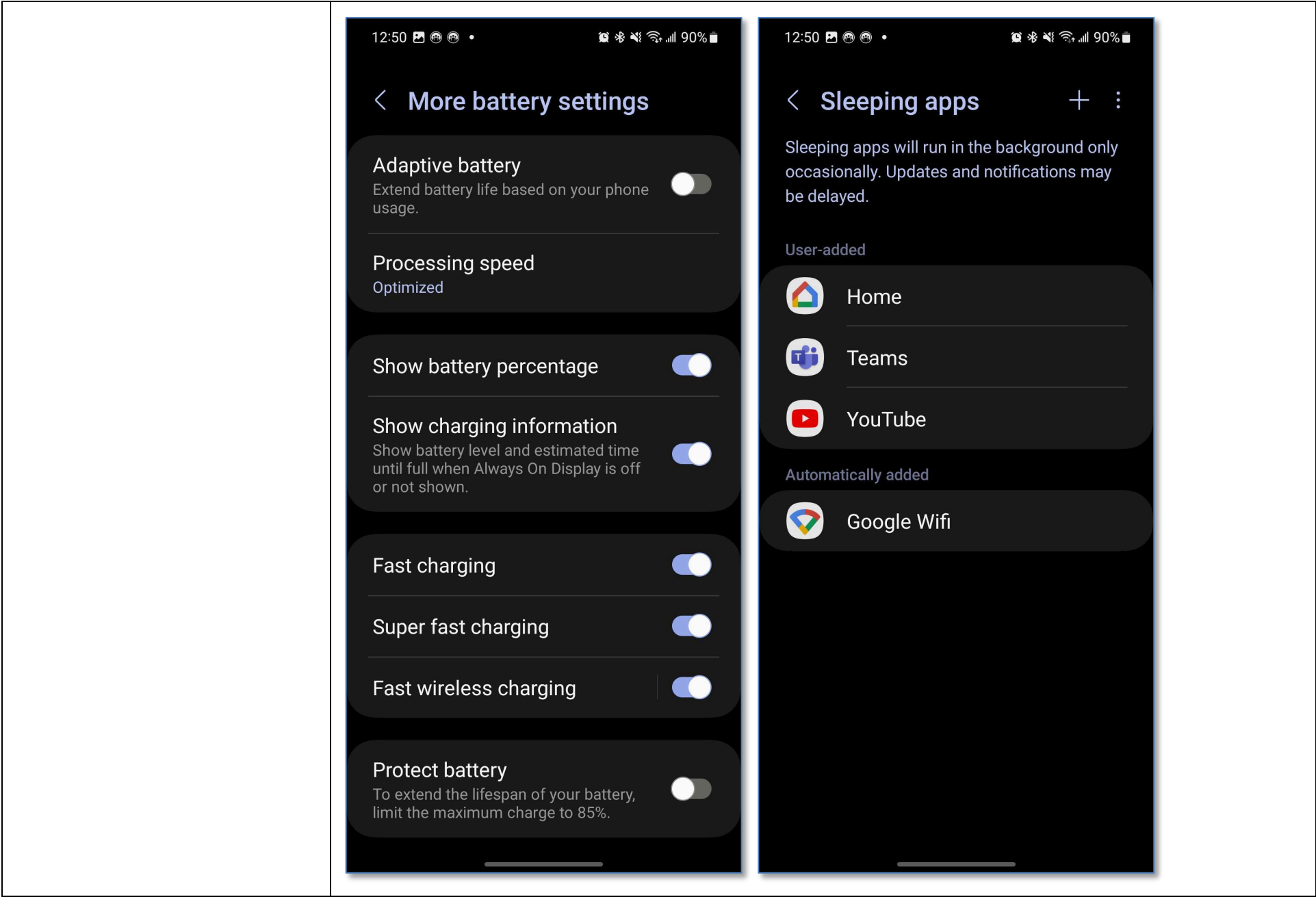
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|       | <p>; <a href="https://developer.android.com/topic/performance/background-optimization">https://developer.android.com/topic/performance/background-optimization</a>; <a href="https://developer.android.com/reference/android/app/job/JobScheduler">https://developer.android.com/reference/android/app/job/JobScheduler</a>; <a href="https://developer.android.com/guide/background/persistent">https://developer.android.com/guide/background/persistent</a>; <a href="https://developer.android.com/guide/components/services">https://developer.android.com/guide/components/services</a>; <a href="https://developer.android.com/guide/components/activities/intro-activities">https://developer.android.com/guide/components/activities/intro-activities</a>; <a href="https://developer.android.com/reference/java/net/URLConnection">https://developer.android.com/reference/java/net/URLConnection</a>; <a href="https://developer.android.com/training/articles/security-ssl">https://developer.android.com/training/articles/security-ssl</a>; <a href="https://developer.android.com/reference/android/net/DnsResolver">https://developer.android.com/reference/android/net/DnsResolver</a>; <a href="https://developer.android.com/guide/topics/media">https://developer.android.com/guide/topics/media</a>; <a href="https://developer.android.com/media">https://developer.android.com/media</a>; <a href="https://developer.android.com/guide/topics/media/platform/mediaplayer">https://developer.android.com/guide/topics/media/platform/mediaplayer</a>; <i>see also</i> the exemplary screenshots below:</p> |

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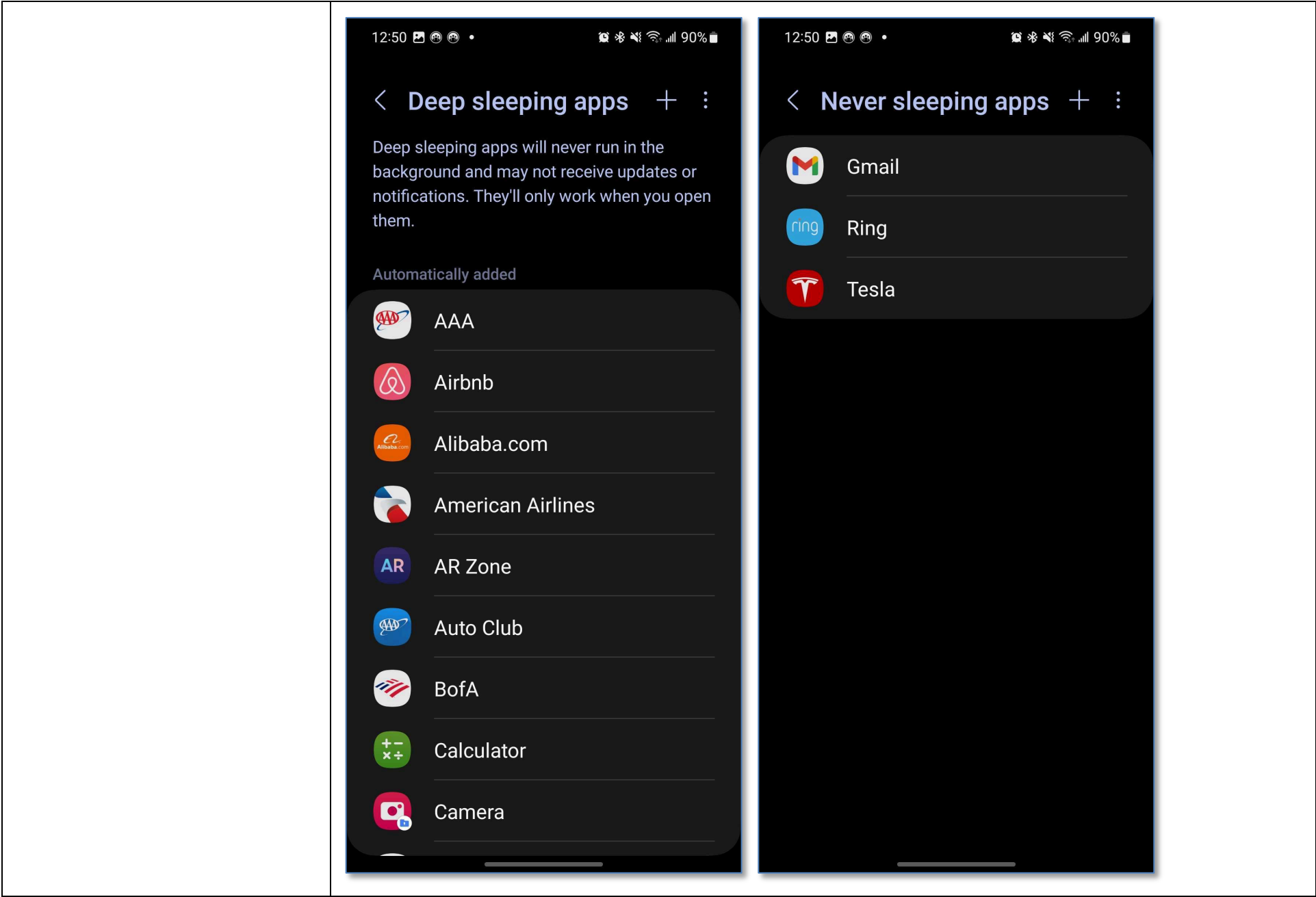


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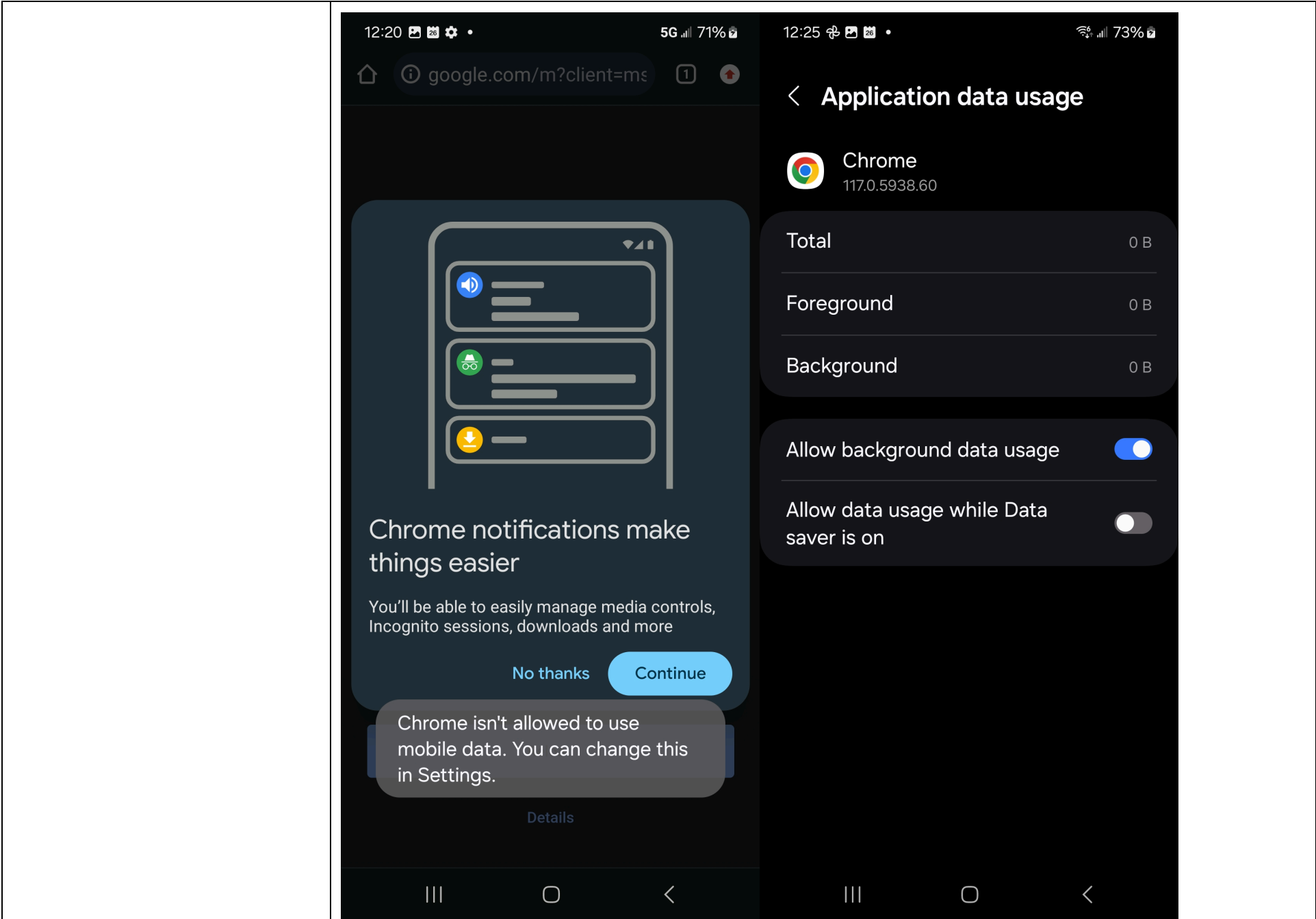




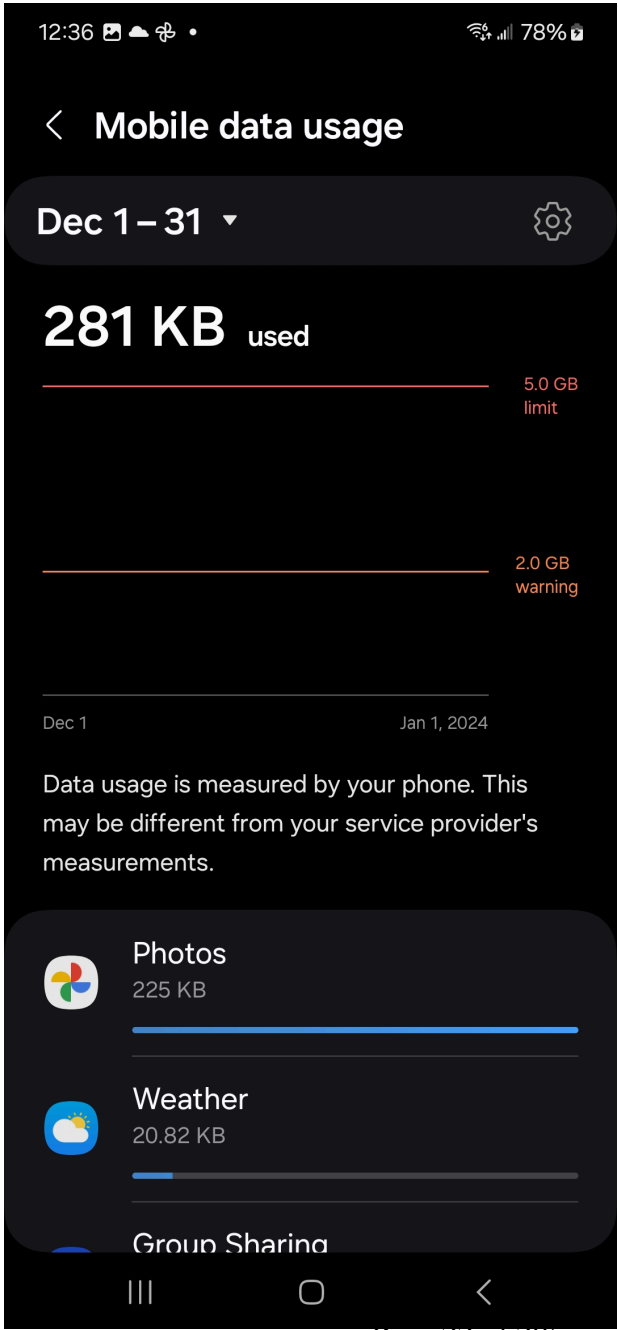
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|       | <p><i>See also, e.g.,</i> <a href="https://www.verizon.com/plans/">https://www.verizon.com/plans/</a>; <a href="https://www.verizon.com/business/products/plans/">https://www.verizon.com/business/products/plans/</a>; <a href="https://www.verizon.com/plans/international/international-travel/">https://www.verizon.com/plans/international/international-travel/</a>; <a href="https://www.verizon.com/support/international-travel-faqs/">https://www.verizon.com/support/international-travel-faqs/</a>.</p> <p><i>See also, e.g.,</i> VZN-HW0000220 (and the Verizon requirements plans/documents referenced therein, as well as similar Verizon Requirement Plan(s), e.g., VZN-HW0177206; VZN-HW0175764; VZN-HW0177547; VZN-HW0175706; VZN-HW0176298; VZN-HW0174414; VZN-HW0175852; VZN-HW0175684; VZN-HW0175615; VZN-HW0177896; VZN-HW0174579; VZN-HW0176039; VZN-HW0176619; VZN-HW0175530; VZN-HW0174481; VZN-HW0176225; VZN-HW0174810; VZN-HW0177800; VZN-HW0174672; VZN-HW0175151; VZN-HW0176639; VZN-HW0174543; VZN-HW0175659; VZN-HW0176530; VZN-HW0174593; VZN-HW0178394; VZN-HW0174828; VZN-HW0175450; VZN-HW0176204; VZN-HW0176982; VZN-HW0176005; VZN-HW0175549; VZN-HW0178430; VZN-HW0176958; VZN-HW0178438; VZN-HW0176578; VZN-HW0176348; VZN-HW0175719; VZN-HW0176376; VZN-HW0175638; VZN-HW0173989; VZN-HW0168826; VZN-HW0172610; VZN-HW0170830; VZN-HW0170123; VZN-HW0170020; VZN-HW0176096; VZN-HW0173579; VZN-HW0168055; VZN-HW0173207; VZN-HW0175801; VZN-HW0171292; VZN-HW0176404; VZN-HW0169708; VZN-HW0174711; VZN-HW0171041; VZN-HW0168438; VZN-HW0169144; VZN-HW0171034; VZN-HW0176253; VZN-HW0168937; VZN-HW0178208; VZN-HW0168214; VZN-HW0177919; VZN-HW0177231; VZN-HW0170855; VZN-HW0173155; VZN-HW0169753; VZN-HW0172836; VZN-HW0178369; VZN-HW0175490; VZN-HW0170876; VZN-HW0173388; VZN-HW0175252; VZN-HW0171269; VZN-HW0177977; VZN-HW0170140; VZN-HW0171240; VZN-HW0171064; VZN-HW0171315; VZN-HW0173181; VZN-HW0168426; VZN-HW0171251; VZN-HW0177620; VZN-HW0168225; VZN-HW0177024; VZN-HW0174394; VZN-HW0176581; VZN-HW0173422; VZN-HW0171072; VZN-HW0173513; VZN-HW0174896; VZN-HW0173177; VZN-HW0168888; VZN-HW0173571; VZN-HW0168293; VZN-HW0172626; VZN-HW0168153; VZN-HW0168467; VZN-HW0172868; VZN-HW0169975; VZN-HW0176672; VZN-HW0173107; VZN-HW0169867; VZN-HW0169801; VZN-HW0170042; VZN-HW0169032; VZN-HW0172889; VZN-HW0172906; VZN-HW0174107; VZN-HW0169470; VZN-HW0168191; VZN-HW0168925; VZN-HW0168092; VZN-HW0172748; VZN-HW0172440; VZN-HW0174270; VZN-HW0172200; VZN-HW0168510; VZN-HW0173610; VZN-HW0173815; VZN-HW0170808; VZN-HW0172082; VZN-HW0173375; VZN-HW0168759; VZN-HW0171739; VZN-HW0168541; VZN-HW0169588; VZN-</p> |

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|  | HW0170882; VZN-HW0172312; VZN-HW0171091; VZN-HW0173217; VZN-HW0169926; VZN-HW0169149; VZN-HW0170627; VZN-HW0170151; VZN-HW0171347).  |
| [1c] determine whether the service usage activity comprises a background activity; | <p>The Accused Instrumentalities “determine whether the service usage activity comprises a background activity.”</p> <p>For example, Samsung’s devices, including the Samsung Galaxy S22, run the Android Operating System, which includes features such as “Data Saver,” or “Power Saver,” “Doze Mode,” “App Standby,” “Adaptive Battery,” and/or “JobScheduler” through which the device determines whether the service usage activity comprises background or foreground activity. <i>See, e.g.</i>, <a href="https://www.verizon.com/smartphones/samsung-galaxy-s22/">https://www.verizon.com/smartphones/samsung-galaxy-s22/</a>:</p> |

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**Performance**

**Bluetooth**

Y, BT 5.2

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**Processor**

Snapdragon 8 Gen 1 Mobile Platform, Octa-Core, 2.99GHz, 2.4GHz, 1.7GHz

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**Storage**

128GB/256GB (ROM) + 8GB (RAM)

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**OS**

Android 12 (S OS)

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**Expandable Memory**

No

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**Hotspot**

Y, (3G : 5 devices, 4G/5G : 10 devices)





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**Security**

Fingerprint, face lock

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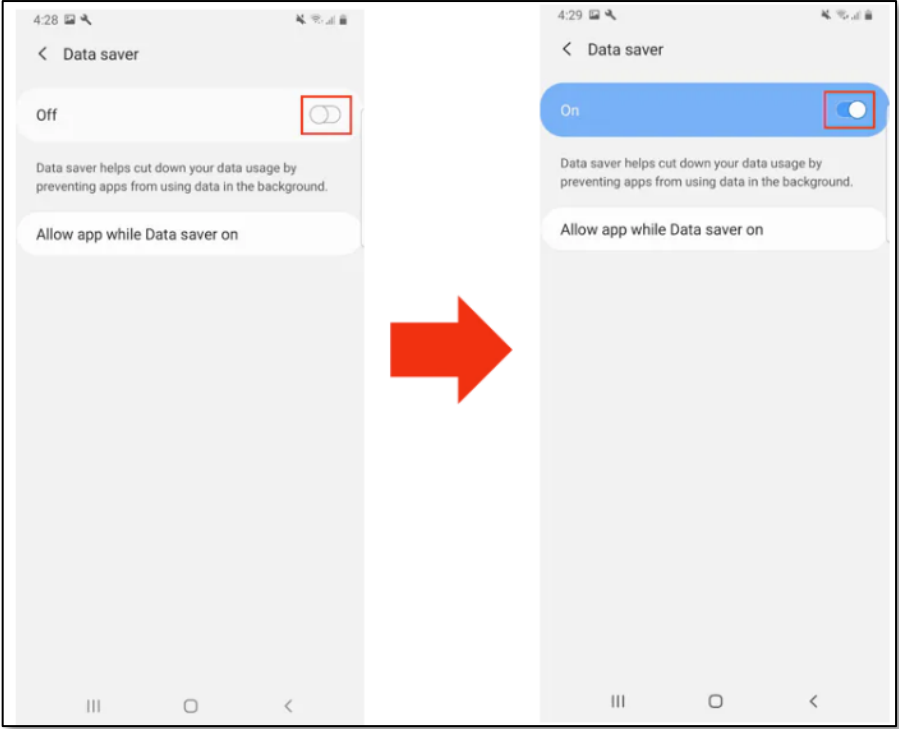
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|       | <p>; <a href="https://www.verizon.com/support/knowledge-base-236117/">https://www.verizon.com/support/knowledge-base-236117/</a>:</p> <div><h2>Samsung Galaxy S21 5G / Galaxy S21 Ultra 5G - Manage Data Usage</h2><div><p>NOTE</p><ul style="list-style-type: none"><li>• Data usage info provided by the device may differ from actual usage. For data usage info provided by Verizon, refer to the <a href="#">My Verizon website</a>.</li><li>•  For a better understanding of how data is used, check out this <a href="#">video</a>.</li><li>• To control data usage on your account, refer to <a href="#">Verizon Smart Family™</a>.</li></ul></div><ol style="list-style-type: none"><li>1. From a Home screen, swipe up from the center of the display to access the apps screen.<br/>→ These instructions only apply to <a href="#">Standard mode</a> and the default <a href="#">Home screen layout</a>.</li><li>2. Navigate: <b>Settings</b>  <b>Connections</b>.</li><li>3. Tap <b>Data usage</b> then do any of the following:<ul style="list-style-type: none"><li>• Turn Data saver off<ol style="list-style-type: none"><li>a. Tap <b>Data saver</b>.</li><li>b. Tap the Data saver switch to turn on  or off  .<br/>→ Data saver must be turned off to use Mobile Hotspot.</li></ol></li></ul></li></ol></div> <p>; <a href="https://www.samsung.com/us/support/answer/ANS00079018/">https://www.samsung.com/us/support/answer/ANS00079018/</a>:</p> |

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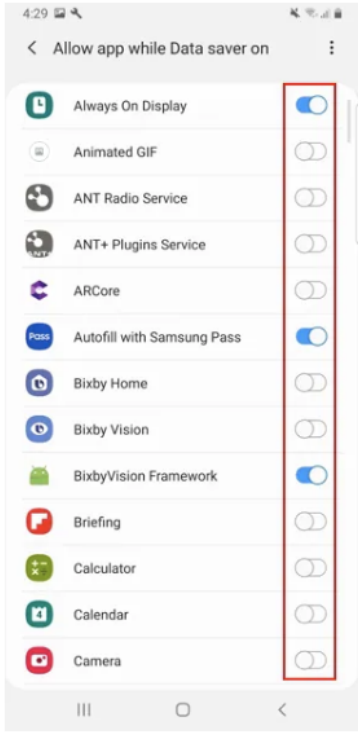
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|-------|--|
|       | <div><div><div><div>Turn Data saver on or off</div><div><div></div></div><div>Data saver prevents some apps from sending or receiving data in the background. So rest assured, you're not wasting any precious data.</div><div><div><div>1. Navigate to and open <b>Settings</b>, and then tap <b>Connections</b>.</div><div>2. Tap <b>Data usage</b>, tap <b>Data saver</b>, and then tap the <b>switch</b> next to Turn on now.</div><div>3. If there are still some apps you'd like to run in the background, you can set them as exceptions. Tap <b>Allowed to use data while Data saver is on</b> at the bottom of the screen.</div><div>4. Tap <b>More options</b> (the three vertical dots) and choose <b>Show system apps</b> or <b>Show allowed apps first</b> to narrow down the list.</div><div>5. Finally, tap the <b>switch(es)</b> next to your desired app(s).</div></div></div><div><div><div>12:45</div><div>&lt; Allowed to use data while... :<div><div><div>Android Auto</div><div></div></div><div><div>Android Setup</div><div></div></div><div><div>Angry Birds</div><div></div></div></div></div></div></div></div><div>; <a href="https://www.samsung.com/ae/support/mobile-devices/android-pie-what-is-the-data-saver-feature/">https://www.samsung.com/ae/support/mobile-devices/android-pie-what-is-the-data-saver-feature/</a>;</div></div></div> |



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|       | <div><p>6 Toggle the switches on next to the apps that you need to receive notifications from all the time. Email, Messages, Messenger, Instagram and Facebook are all popular options to allow unrestricted data access..</p><p>The screenshot shows the 'Allow app while Data saver on' settings page. A red box highlights the toggle switches for the following apps: Always On Display (on), Animated GIF (off), ANT Radio Service (off), ANT+ Plugins Service (off), ARCore (off), Autofill with Samsung Pass (on), Bixby Home (off), Bixby Vision (off), BixbyVision Framework (on), Briefing (off), Calculator (off), Calendar (off), and Camera (off).</p></div> <p>; <a href="https://www.samsung.com/us/support/answer/ANS00078987/">https://www.samsung.com/us/support/answer/ANS00078987/</a>:</p> |

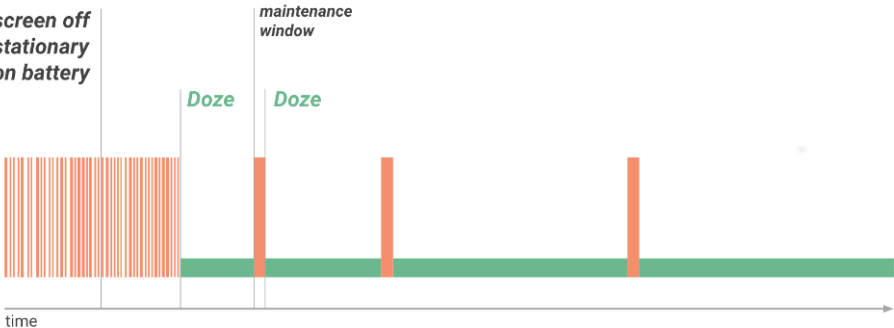
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|       | <div><div><div><div>Power saving mode</div><div><p><b>Note:</b> Using Power saving mode can affect app and device performance. Some tasks and features may take longer to complete or update. Additionally, apps running in the background may not receive updates or send you notifications when Power saving mode is enabled.</p><p>Before you turn in for the night, change your phone's power mode. This will decrease your phone's performance and save battery life.</p><ol style="list-style-type: none"><li>1. Navigate to and open <b>Settings</b>, and then tap <b>Battery and device care</b>.</li><li>2. Tap <b>Battery</b>, and then tap <b>Power saving</b>.</li><li>3. Tap the <b>switches</b> next to your desired settings or customizations.</li><li>4. Finally, tap the <b>switch</b> at the top of the screen to activate Power saving mode.</li></ol><p>You will not be able to adjust the settings once the mode is enabled. If you want to change any of the settings, you'll need to temporarily disable Power saving mode.</p></div><div><div>Power saving options</div><div>Choose additional limits to save battery when Power saving mode is on.</div><div><div>Turn off Always On Display</div><div>Limit CPU speed to 70%</div><div>Decrease brightness by 10%</div></div></div></div></div><div><p>; <a href="https://developer.android.com/training/basics/network-ops/data-saver">https://developer.android.com/training/basics/network-ops/data-saver</a>:</p><div><div><div>Optimize network data usage</div><div><p>Over the life of a smartphone, the cost of a cellular data plan can easily exceed the cost of the device itself. On Android 7.0 (API level 24) and higher, users can enable Data Saver on a device-wide basis in order to optimize their device's data usage, and use less data. This ability is especially useful when roaming, near the end of the billing cycle, or for a small prepaid data pack.</p><p>When a user enables Data Saver in <b>Settings</b> and the device is on a metered network, the system blocks background data usage and signals apps to use less data in the foreground wherever possible. Users can allow specific apps to use background metered data usage even when Data Saver is turned on.</p><p>Android 7.0 (API level 24) extends the <code>ConnectivityManager</code> API to provide apps with a way to <a href="#">retrieve the user's Data Saver preferences</a> and <a href="#">monitor preference changes</a>. It is considered good practice for apps to check whether the user has enabled Data Saver and make an effort to limit foreground and background data usage.</p></div></div></div></div></div> |

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|       | <div><p><b>Check data saver preferences</b></p><p>On Android 7.0 (API level 24) and higher, apps can use the <code>ConnectivityManager</code> API to determine what data usage restrictions are being applied. The <code>getRestrictBackgroundStatus()</code> method returns one of the following values:</p><div><p><code>RESTRICT_BACKGROUND_STATUS_DISABLED</code></p><p>Data Saver is disabled.</p><p><code>RESTRICT_BACKGROUND_STATUS_ENABLED</code></p><p>The user has enabled Data Saver for this app. Apps should make an effort to limit data usage in the foreground and gracefully handle restrictions to background data usage.</p><p><code>RESTRICT_BACKGROUND_STATUS_WHITELISTED</code></p><p>The user has enabled Data Saver but the app is allowed to bypass it. Apps should still make an effort to limit foreground and background data usage.</p></div><p>Limit data usage whenever the device is connected to a metered network, even if Data Saver is disabled or the app is allowed to bypass it. The following sample code uses <code>ConnectivityManager.isActiveNetworkMetered()</code> and <code>ConnectivityManager.getRestrictBackgroundStatus()</code> to determine how much data the app should use:</p></div> <p>; <a href="https://developer.android.com/training/monitoring-device-state/doze-standby">https://developer.android.com/training/monitoring-device-state/doze-standby</a>;</p> <div><p><b>Optimize for Doze and App Standby</b></p><p>Starting from Android 6.0 (API level 23), Android introduces two power-saving features that extend battery life for users by managing how apps behave when a device is not connected to a power source. <i>Doze</i> reduces battery consumption by deferring background CPU and network activity for apps when the device is unused for long periods of time. <i>App Standby</i> defers background network activity for apps with which the user has not recently interacted.</p><p>While the device is in Doze, apps' access to certain battery-intensive resources is deferred until maintenance windows. The specific restrictions are listed in <a href="#">Power Management Restrictions</a>.</p><p>Doze and App Standby manage the behavior of all apps running on Android 6.0 or higher, regardless whether they are specifically targeting API level 23. To ensure the best experience for users, test your app in Doze and App Standby modes and make any necessary adjustments to your code. The sections below provide details.</p></div> |

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|       | <div><div><div><div><div><div><b>Understanding Doze</b></div><div><p>If a user leaves a device unplugged and stationary for a period of time, with the screen off, the device enters Doze mode. In Doze mode, the system attempts to conserve battery by restricting apps’ access to network and CPU-intensive services. It also prevents apps from accessing the network and defers their jobs, syncs, and standard alarms.</p><p>Periodically, the system exits Doze for a brief time to let apps complete their deferred activities. During this <i>maintenance window</i>, the system runs all pending syncs, jobs, and alarms, and lets apps access the network.</p></div></div></div><div><div><div><div><div><div><div>screen off<br/>stationary<br/>on battery</div><div>Doze</div><div>Doze</div></div><div></div><div><p>time</p></div></div><div><p>Figure 1. Doze provides a recurring maintenance window for apps to use the network and handle pending activities.</p></div></div></div><div><div><p>At the conclusion of each maintenance window, the system again enters Doze, suspending network access and deferring jobs, syncs, and alarms. Over time, the system schedules maintenance windows less and less frequently, helping to reduce battery consumption in cases of longer-term inactivity when the device is not connected to a charger.</p><p>As soon as the user wakes the device by moving it, turning on the screen, or connecting a charger, the system exits Doze and all apps return to normal activity.</p></div></div><div><div><p>The Doze restriction on network access is also likely to affect your app, especially if the app relies on real-time messages such as tickles or notifications. If your app requires a persistent connection to the network to receive messages, you should use <a href="#">Firebase Cloud Messaging (FCM)</a> if possible.</p></div></div><div><p>; <a href="https://developer.android.com/topic/performance/appstandby">https://developer.android.com/topic/performance/appstandby</a>:</p></div></div></div></div></div></div> |

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## App Standby Buckets

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★ **Note:** Every manufacturer can set their own criteria for how non-active apps are assigned to buckets. You should not try to influence which bucket your app is assigned to. Instead, focus on making sure your app behaves well in whatever bucket it might be in. Your app can find out what bucket it's currently in by calling [`UsageStatsManager.getAppStandbyBucket\(\)`](#).

The buckets are:

1. **Active:** App is currently being used or was very recently used.
2. **Working set:** App is in regular use.
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In addition, there's a special **never** bucket for apps that have been installed but have never been run. The system imposes severe restrictions on these apps.

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|       | <p> <a href="https://developer.android.com/topic/performance/power/power-details">https://developer.android.com/topic/performance/power/power-details</a>; <a href="https://developer.android.com/topic/performance/background-optimization">https://developer.android.com/topic/performance/background-optimization</a>; <a href="https://developer.android.com/reference/android/app/job/JobScheduler">https://developer.android.com/reference/android/app/job/JobScheduler</a>; <a href="https://developer.android.com/guide/background/persistent">https://developer.android.com/guide/background/persistent</a>; <a href="https://developer.android.com/guide/components/activities/activity-lifecycle">https://developer.android.com/guide/components/activities/activity-lifecycle</a>; <a href="https://developer.android.com/guide/components/activities/process-lifecycle">https://developer.android.com/guide/components/activities/process-lifecycle</a>;         </p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>1. A <b>foreground process</b> is one that is required for what the user is currently doing. Various application components can cause its containing process to be considered foreground in different ways. A process is considered to be in the foreground if any of the following conditions hold:</p> <ul style="list-style-type: none"> <li>• It is running an <b>Activity</b> at the top of the screen that the user is interacting with (its <b>onResume()</b> method has been called).</li> <li>• It has a <b>BroadcastReceiver</b> that is currently running (its <b>BroadcastReceiver.onReceive()</b> method is executing).</li> <li>• It has a <b>Service</b> that is currently executing code in one of its callbacks (<b>Service.onCreate()</b>, <b>Service.onStart()</b>, or <b>Service.onDestroy()</b>).</li> </ul> <p>There will only ever be a few such processes in the system, and these will only be killed as a last resort if memory is so low that not even these processes can continue to run. Generally, at this point, the device has reached a memory paging state, so this action is required in order to keep the user interface responsive.</p> </div> <p>; <a href="https://developer.android.com/guide/background">https://developer.android.com/guide/background</a>:</p> |

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|       | <div><p><b>Definition of background work</b></p><p>An app is running in the <i>background</i> when both the following conditions are satisfied:</p><ul style="list-style-type: none"><li>• None of the app's activities are currently visible to the user.</li><li>• The app isn't running any <b>foreground services</b> that started while an activity from the app was visible to the user.</li></ul><p>Otherwise, the app is running in the <i>foreground</i>.</p></div> <p>; <a href="https://developer.android.com/guide/components/services">https://developer.android.com/guide/components/services</a>;</p> |



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## Types of Services

These are the three different types of services:

### Foreground

A foreground service performs some operation that is noticeable to the user. For example, an audio app would use a foreground service to play an audio track. Foreground services must display a [Notification](#). Foreground services continue running even when the user isn't interacting with the app.

When you use a foreground service, you must display a notification so that users are actively aware that the service is running. This notification cannot be dismissed unless the service is either stopped or removed from the foreground.

Learn more about how to configure [foreground services](#) in your app.

★ **Note:** The [WorkManager](#) API offers a flexible way of scheduling tasks, and is able to [run these jobs as foreground services](#) if needed. In many cases, using WorkManager is preferable to using foreground services directly.

### Background

A background service performs an operation that isn't directly noticed by the user. For example, if an app used a service to compact its storage, that would usually be a background service.

★ **Note:** If your app targets API level 26 or higher, the system imposes [restrictions on running background services](#) when the app itself isn't in the foreground. In most situations, for example, you shouldn't [access location information from the background](#). Instead, [schedule tasks using WorkManager](#).

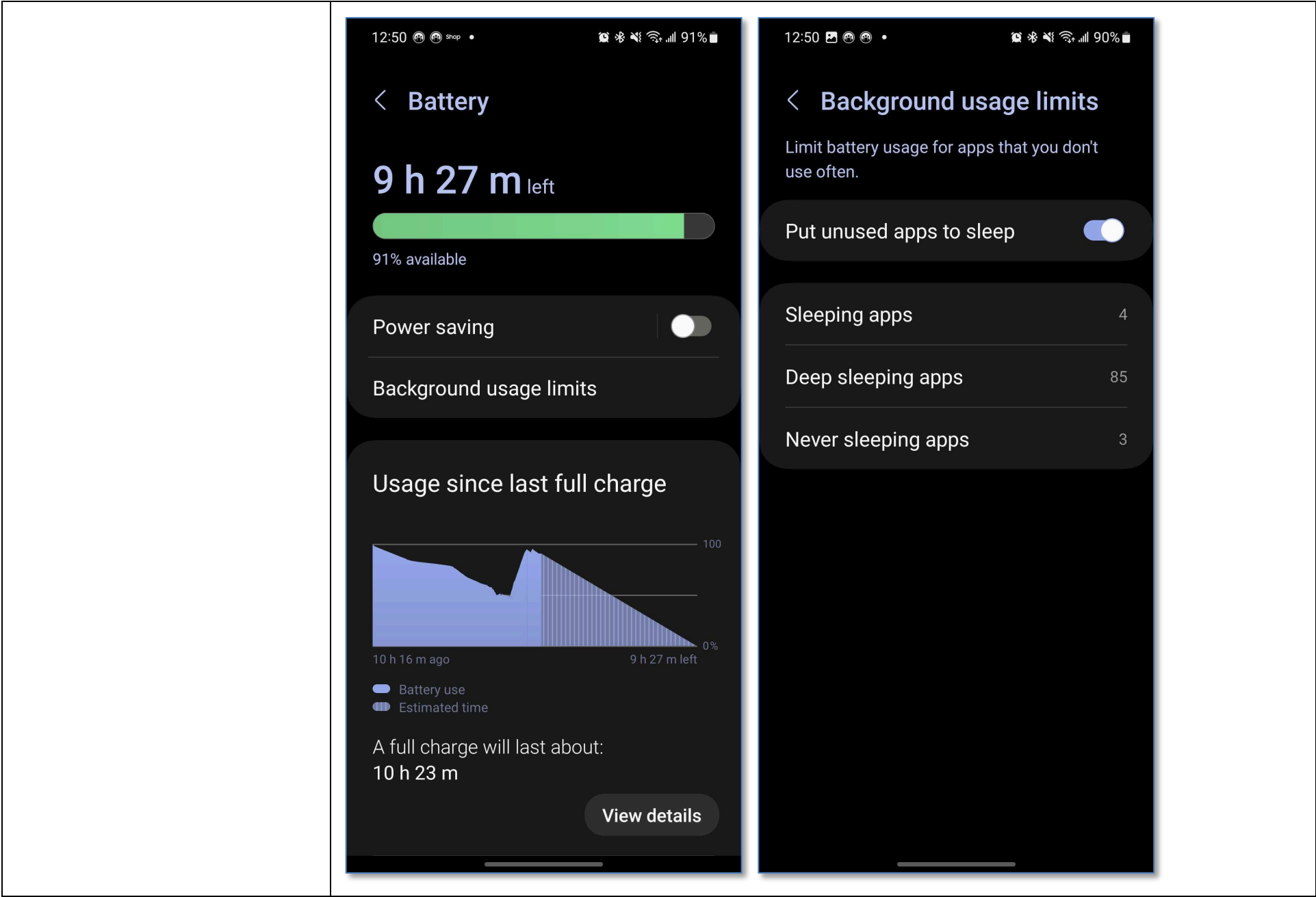
### Bound

A service is *bound* when an application component binds to it by calling `bindService()`. A bound service offers a client-server interface that allows components to interact with the service, send requests, receive results, and even do so across processes with interprocess communication (IPC). A bound service runs only as long as another application component is bound to it. Multiple components can bind to the service at once, but when all of them unbind, the service is destroyed.

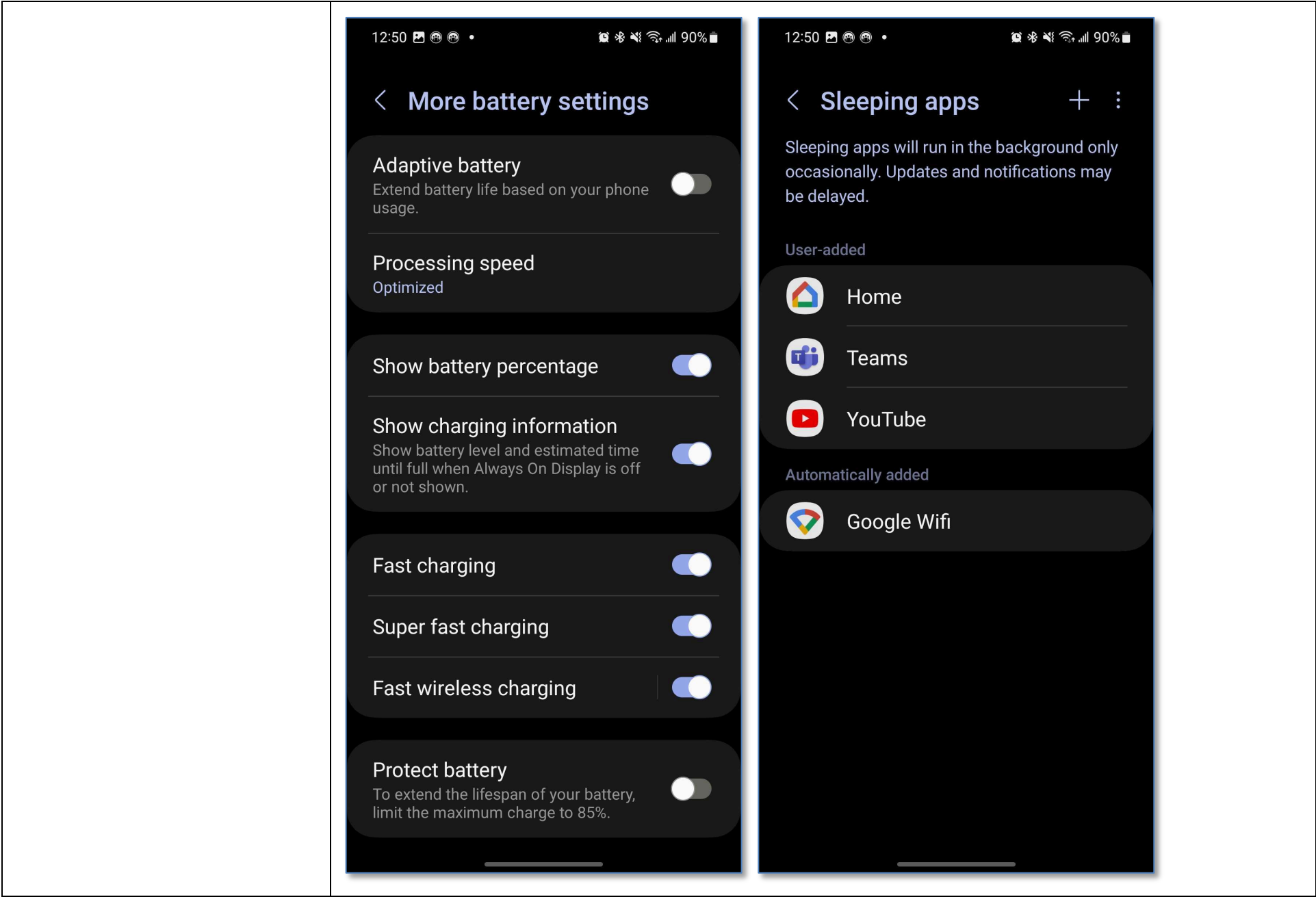
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|       | ; <a href="https://developer.android.com/guide/components/activities/intro-activities">https://developer.android.com/guide/components/activities/intro-activities</a> ; <i>see also</i> the exemplary screen-shots below: |

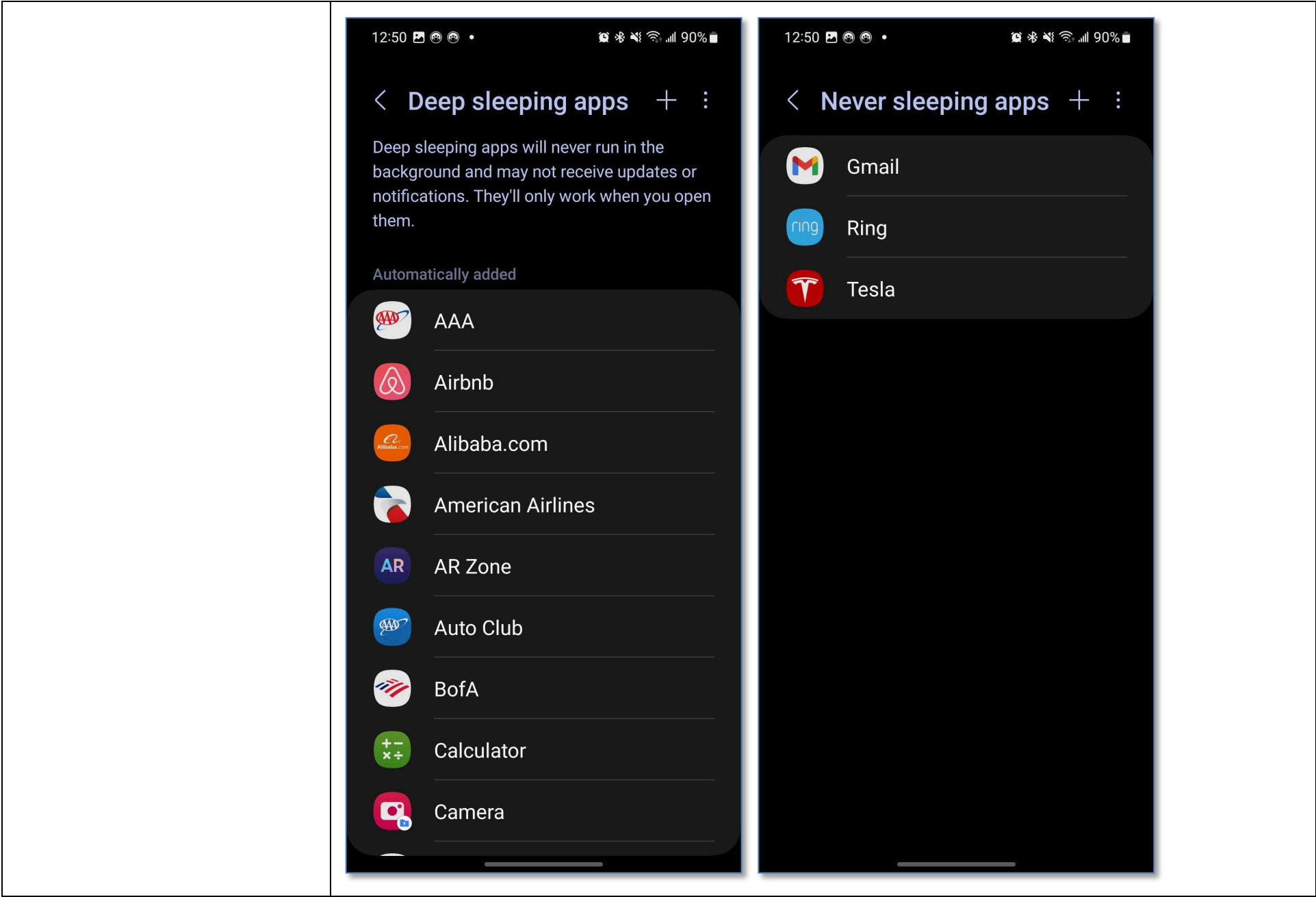
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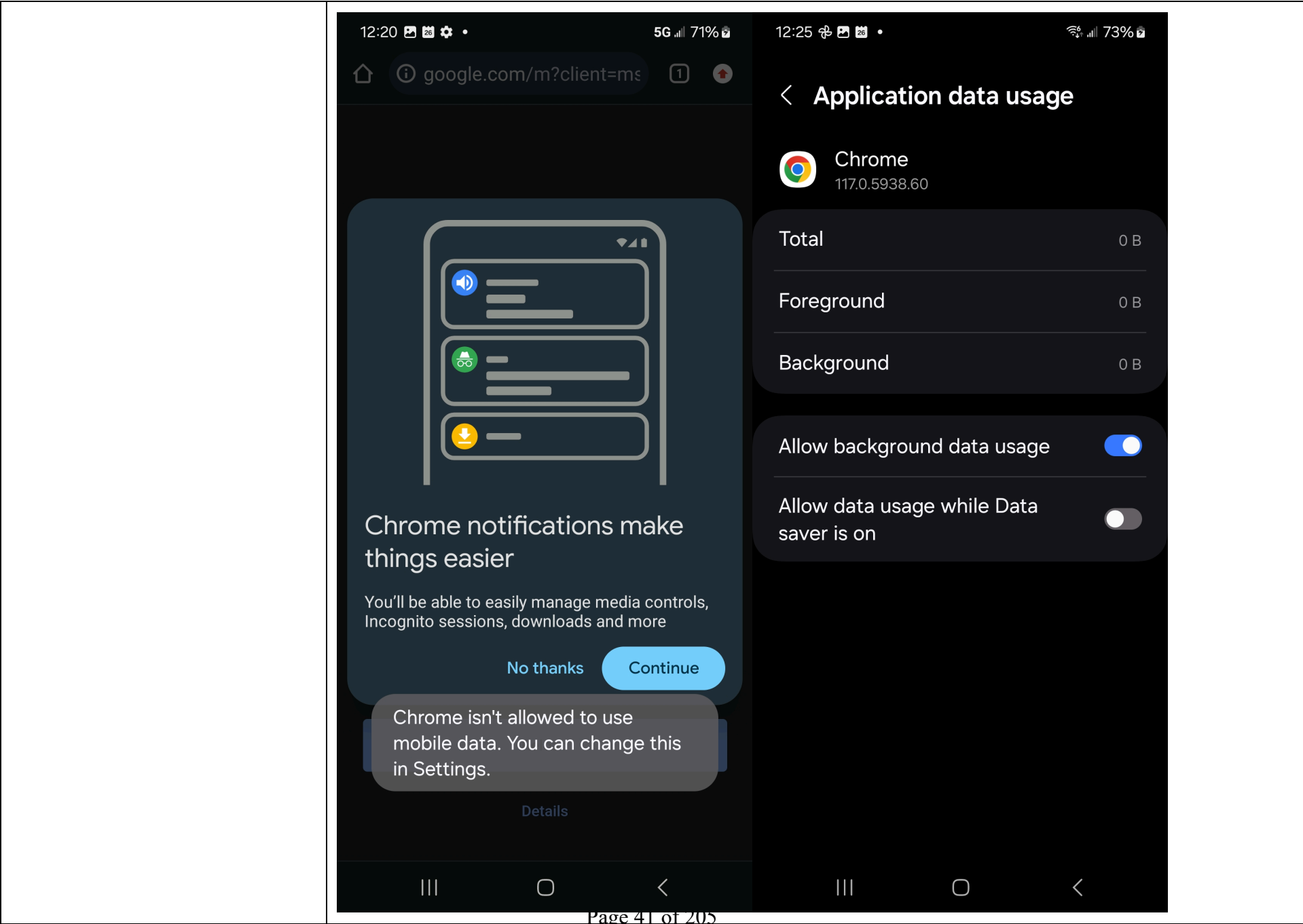
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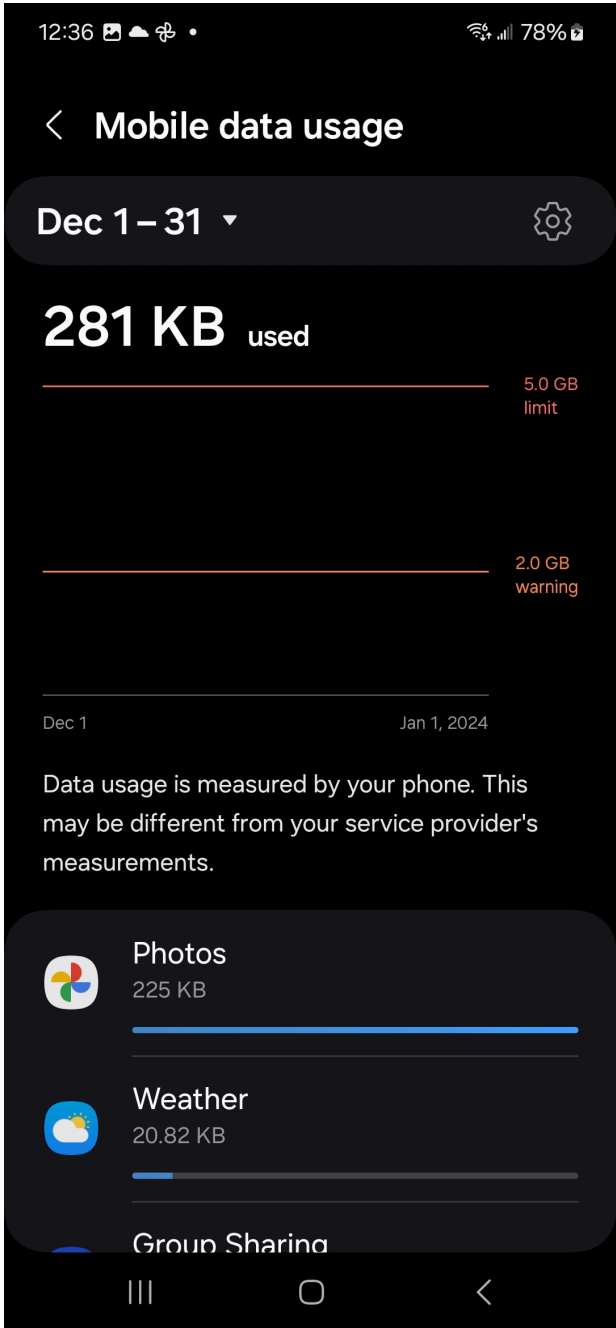
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|       | <p><i>See also, e.g., <a href="https://www.verizon.com/support/data-usage-faqs/">https://www.verizon.com/support/data-usage-faqs/</a>:</i></p> <p><b>What is indirect or background data usage?</b> </p> <p>Indirect data usage occurs in the background, during tasks performed automatically by your device. Some examples of indirect data usage are:</p> <ul style="list-style-type: none"> <li>• Automatic backups of pictures or videos</li> <li>• Software updates</li> <li>• App content refreshes</li> <li>• Syncing and location services</li> </ul> <p>Note: You can adjust these functions in your device Settings.</p> <p><i>See also, e.g., VZN-HW0000220 (and the Verizon requirements plans/documents referenced therein, as well as similar Verizon Requirement Plan(s), e.g., VZN-HW0177206; VZN-HW0175764; VZN-HW0177547; VZN-HW0175706; VZN-HW0176298; VZN-HW0174414; VZN-HW0175852; VZN-HW0175684; VZN-HW0175615; VZN-HW0177896; VZN-HW0174579; VZN-HW0176039; VZN-HW0176619; VZN-HW0175530; VZN-HW0174481; VZN-HW0176225; VZN-HW0174810; VZN-HW0177800; VZN-HW0174672; VZN-HW0175151; VZN-HW0176639; VZN-HW0174543; VZN-HW0175659; VZN-HW0176530; VZN-HW0174593; VZN-HW0178394; VZN-HW0174828; VZN-HW0175450; VZN-HW0176204; VZN-HW0176982; VZN-HW0176005; VZN-HW0175549; VZN-HW0178430; VZN-HW0176958; VZN-HW0178438; VZN-HW0176578; VZN-HW0176348; VZN-HW0175719; VZN-HW0176376; VZN-HW0175638; VZN-HW0173989; VZN-HW0168826; VZN-HW0172610; VZN-HW0170830; VZN-HW0170123; VZN-HW0170020; VZN-HW0176096; VZN-HW0173579; VZN-</i></p> |



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|   | <p>HW0168055; VZN-HW0173207; VZN-HW0175801; VZN-HW0171292; VZN-HW0176404; VZN-HW0169708; VZN-HW0174711; VZN-HW0171041; VZN-HW0168438; VZN-HW0169144; VZN-HW0171034; VZN-HW0176253; VZN-HW0168937; VZN-HW0178208; VZN-HW0168214; VZN-HW0177919; VZN-HW0177231; VZN-HW0170855; VZN-HW0173155; VZN-HW0169753; VZN-HW0172836; VZN-HW0178369; VZN-HW0175490; VZN-HW0170876; VZN-HW0173388; VZN-HW0175252; VZN-HW0171269; VZN-HW0177977; VZN-HW0170140; VZN-HW0171240; VZN-HW0171064; VZN-HW0171315; VZN-HW0173181; VZN-HW0168426; VZN-HW0171251; VZN-HW0177620; VZN-HW0168225; VZN-HW0177024; VZN-HW0174394; VZN-HW0176581; VZN-HW0173422; VZN-HW0171072; VZN-HW0173513; VZN-HW0174896; VZN-HW0173177; VZN-HW0168888; VZN-HW0173571; VZN-HW0168293; VZN-HW0172626; VZN-HW0168153; VZN-HW0168467; VZN-HW0172868; VZN-HW0169975; VZN-HW0176672; VZN-HW0173107; VZN-HW0169867; VZN-HW0169801; VZN-HW0170042; VZN-HW0169032; VZN-HW0172889; VZN-HW0172906; VZN-HW0174107; VZN-HW0169470; VZN-HW0168191; VZN-HW0168925; VZN-HW0168092; VZN-HW0172748; VZN-HW0172440; VZN-HW0174270; VZN-HW0172200; VZN-HW0168510; VZN-HW0173610; VZN-HW0173815; VZN-HW0170808; VZN-HW0172082; VZN-HW0173375; VZN-HW0168759; VZN-HW0171739; VZN-HW0168541; VZN-HW0169588; VZN-HW0170882; VZN-HW0172312; VZN-HW0171091; VZN-HW0173217; VZN-HW0169926; VZN-HW0169149; VZN-HW0170627; VZN-HW0170151; VZN-HW0171347).</p> |
| <p>[1d] determine at least an aspect of a policy based on a user input obtained through a user interface of the wireless end-user device or based on information from a network element, the policy to be applied if the service usage activity is the background activity, the policy at least for controlling the service usage activity;</p> | <p>The Accused Instrumentalities “determine at least an aspect of a policy based on a user input obtained through a user interface of the wireless end-user device or based on information from a network element, the policy to be applied if the service usage activity is the background activity, the policy at least for controlling the service usage activity.”</p> <p>For example, Samsung’s devices, including the Samsung Galaxy S22, run the Android Operating System, which include an interface which allow users to specify multiple aspects of policies based on user input in various settings (e.g., enabling/disabling Data Saver, Power Saver, Adaptive Battery features, as well as enabling/disabling policies for specific applications) for controlling service usage activities. <i>See, e.g.,</i> <a href="https://www.verizon.com/smartphones/samsung-galaxy-s22/">https://www.verizon.com/smartphones/samsung-galaxy-s22/</a>:</p>  |

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**Performance**

**Bluetooth**

Y, BT 5.2

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**Processor**

Snapdragon 8 Gen 1 Mobile Platform, Octa-Core, 2.99GHz, 2.4GHz, 1.7GHz

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**Storage**

128GB/256GB (ROM) + 8GB (RAM)

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**OS**

Android 12 (S OS)

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**Expandable Memory**

No

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**Hotspot**

Y, (3G : 5 devices, 4G/5G : 10 devices)





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**Security**

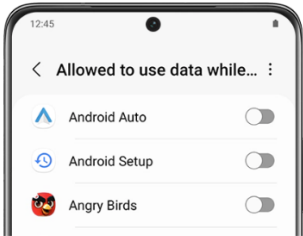
Fingerprint, face lock

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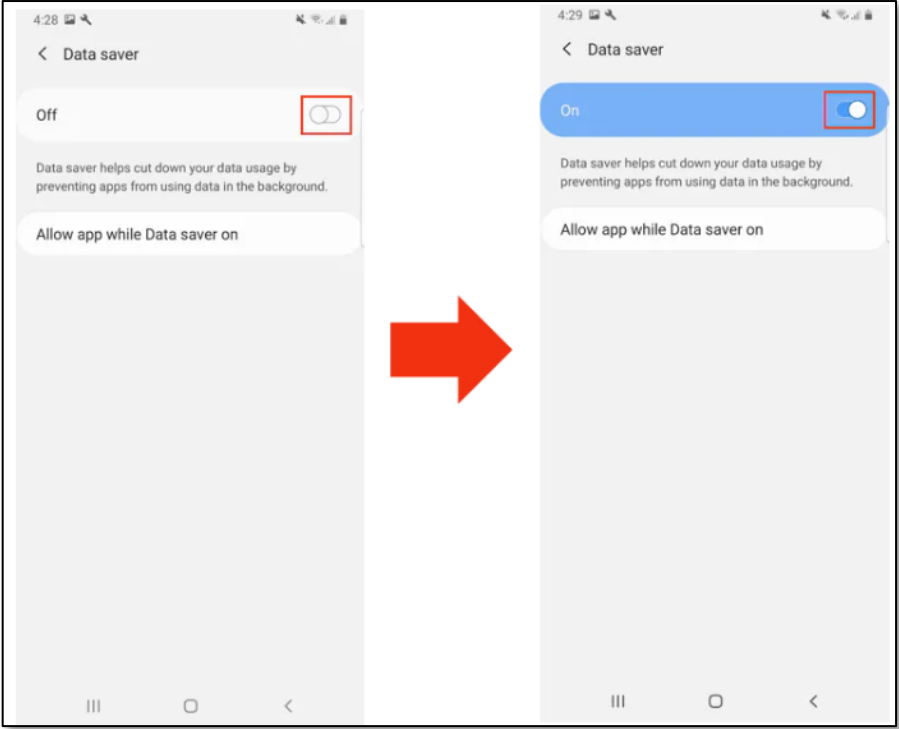
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|       | <p><a href="https://www.verizon.com/support/knowledge-base-236117/">https://www.verizon.com/support/knowledge-base-236117/</a>:</p> <div><h2>Samsung Galaxy S21 5G / Galaxy S21 Ultra 5G - Manage Data Usage</h2><div><p>NOTE</p><ul style="list-style-type: none"><li>• Data usage info provided by the device may differ from actual usage. For data usage info provided by Verizon, refer to the <a href="#">My Verizon website</a>.</li><li>•  For a better understanding of how data is used, check out this <a href="#">video</a>.</li><li>• To control data usage on your account, refer to <a href="#">Verizon Smart Family™</a>.</li></ul></div><ol style="list-style-type: none"><li>1. From a Home screen, swipe up from the center of the display to access the apps screen.<br/>→ These instructions only apply to <a href="#">Standard mode</a> and the default <a href="#">Home screen layout</a>.</li><li>2. Navigate: <b>Settings</b>  <b>Connections</b>.</li><li>3. Tap <b>Data usage</b> then do any of the following:<ul style="list-style-type: none"><li>• Turn Data saver off<ol style="list-style-type: none"><li>a. Tap <b>Data saver</b>.</li><li>b. Tap the Data saver switch to turn on  or off  .<br/>→ Data saver must be turned off to use Mobile Hotspot.</li></ol></li></ul></li></ol></div> <p>; <a href="https://www.samsung.com/us/support/answer/ANS00079018/">https://www.samsung.com/us/support/answer/ANS00079018/</a>:</p> |

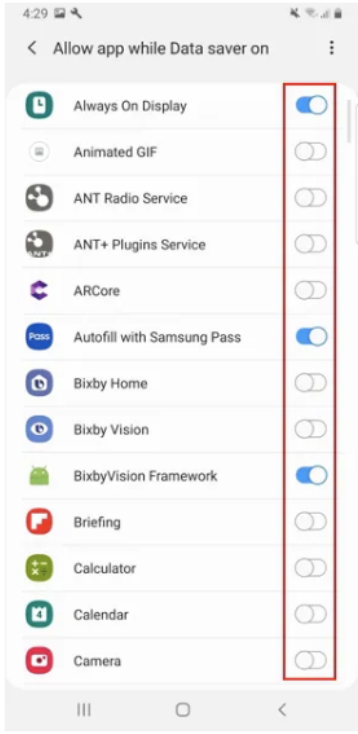
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|       | <div><div><div><div>Turn Data saver on or off</div><div><p>Data saver prevents some apps from sending or receiving data in the background. So rest assured, you're not wasting any precious data.</p><ol style="list-style-type: none"><li>1. Navigate to and open <b>Settings</b>, and then tap <b>Connections</b>.</li><li>2. Tap <b>Data usage</b>, tap <b>Data saver</b>, and then tap the <b>switch</b> next to Turn on now.</li><li>3. If there are still some apps you'd like to run in the background, you can set them as exceptions. Tap <b>Allowed to use data while Data saver is on</b> at the bottom of the screen.</li><li>4. Tap <b>More options</b> (the three vertical dots) and choose <b>Show system apps</b> or <b>Show allowed apps first</b> to narrow down the list.</li><li>5. Finally, tap the <b>switch(es)</b> next to your desired app(s).</li></ol></div><div></div></div></div><div><p>; <a href="https://www.samsung.com/ae/support/mobile-devices/android-pie-what-is-the-data-saver-feature/">https://www.samsung.com/ae/support/mobile-devices/android-pie-what-is-the-data-saver-feature/</a>;</p></div></div> |

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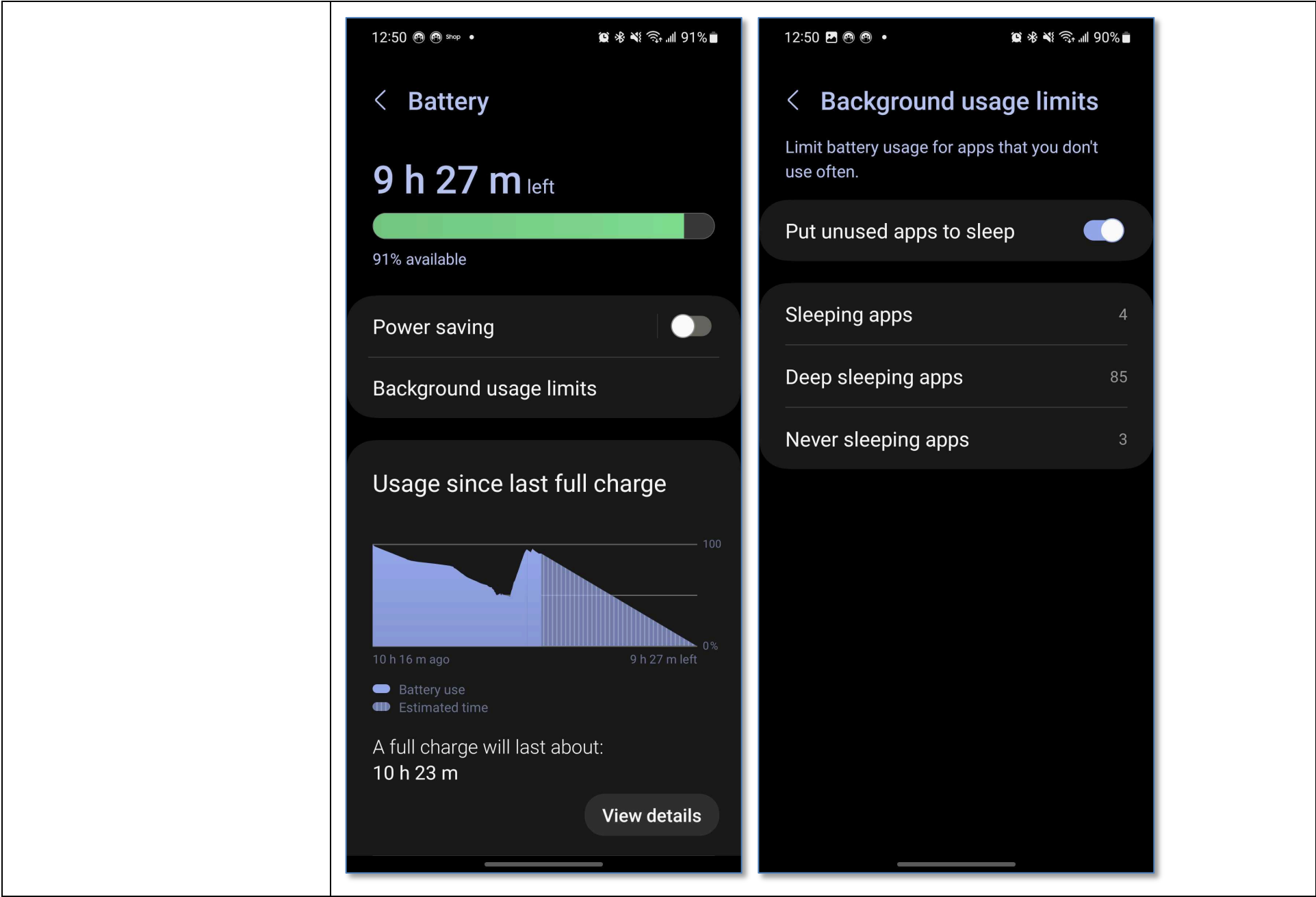
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|       | <div><p>6 Toggle the switches on next to the apps that you need to receive notifications from all the time. Email, Messages, Messenger, Instagram and Facebook are all popular options to allow unrestricted data access..</p><p>The screenshot shows the 'Allow app while Data saver on' settings page. A red rectangular box highlights the toggle switches for the following apps: 'Always On Display' (on), 'Autofill with Samsung Pass' (on), 'BixbyVision Framework' (on), and 'Camera' (off). Other apps like 'Animated GIF', 'ANT Radio Service', 'ANT+ Plugins Service', 'ARCore', 'Bixby Home', 'Bixby Vision', 'Briefing', 'Calculator', and 'Calendar' have their toggles off.</p></div> <p>; <a href="https://www.samsung.com/us/support/answer/ANS00078987/">https://www.samsung.com/us/support/answer/ANS00078987/</a>:</p> |

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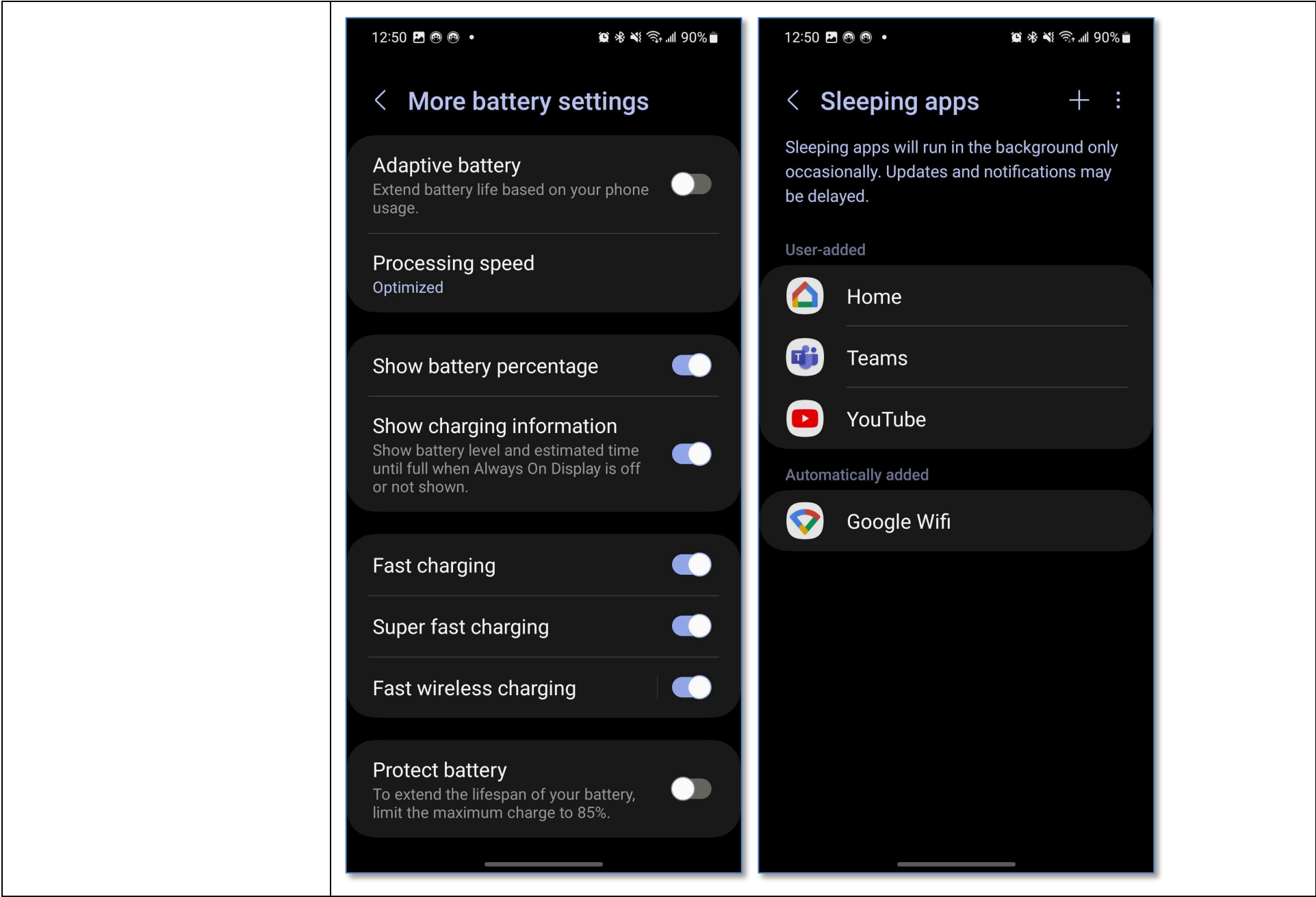
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|       | <div><div>Power saving mode</div><div><p><b>Note:</b> Using Power saving mode can affect app and device performance. Some tasks and features may take longer to complete or update. Additionally, apps running in the background may not receive updates or send you notifications when Power saving mode is enabled.</p><p>Before you turn in for the night, change your phone's power mode. This will decrease your phone's performance and save battery life.</p><div><div><div>1. Navigate to and open <b>Settings</b>, and then tap <b>Battery and device care</b>.</div><div>2. Tap <b>Battery</b>, and then tap <b>Power saving</b>.</div><div>3. Tap the <b>switches</b> next to your desired settings or customizations.</div><div>4. Finally, tap the <b>switch</b> at the top of the screen to activate Power saving mode.</div></div><p>You will not be able to adjust the settings once the mode is enabled. If you want to change any of the settings, you'll need to temporarily disable Power saving mode.</p></div><div><div>Power saving options</div><div>Choose additional limits to save battery when Power saving mode is on.</div><div><div>Turn off Always On Display</div><div>Limit CPU speed to 70%</div><div>Decrease brightness by 10%</div></div></div></div><p><i>see also the exemplary screenshots below:</i></p></div> |

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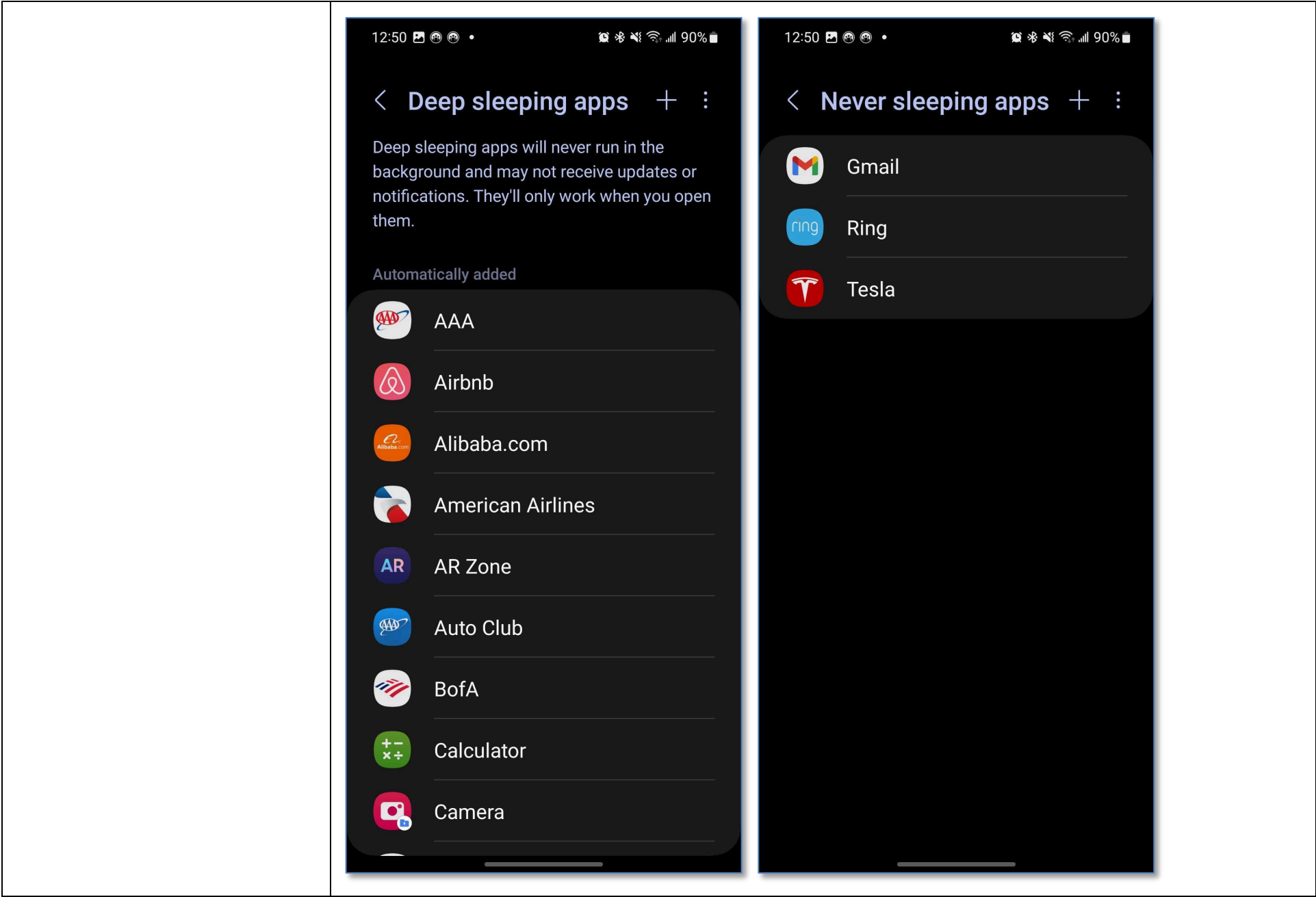




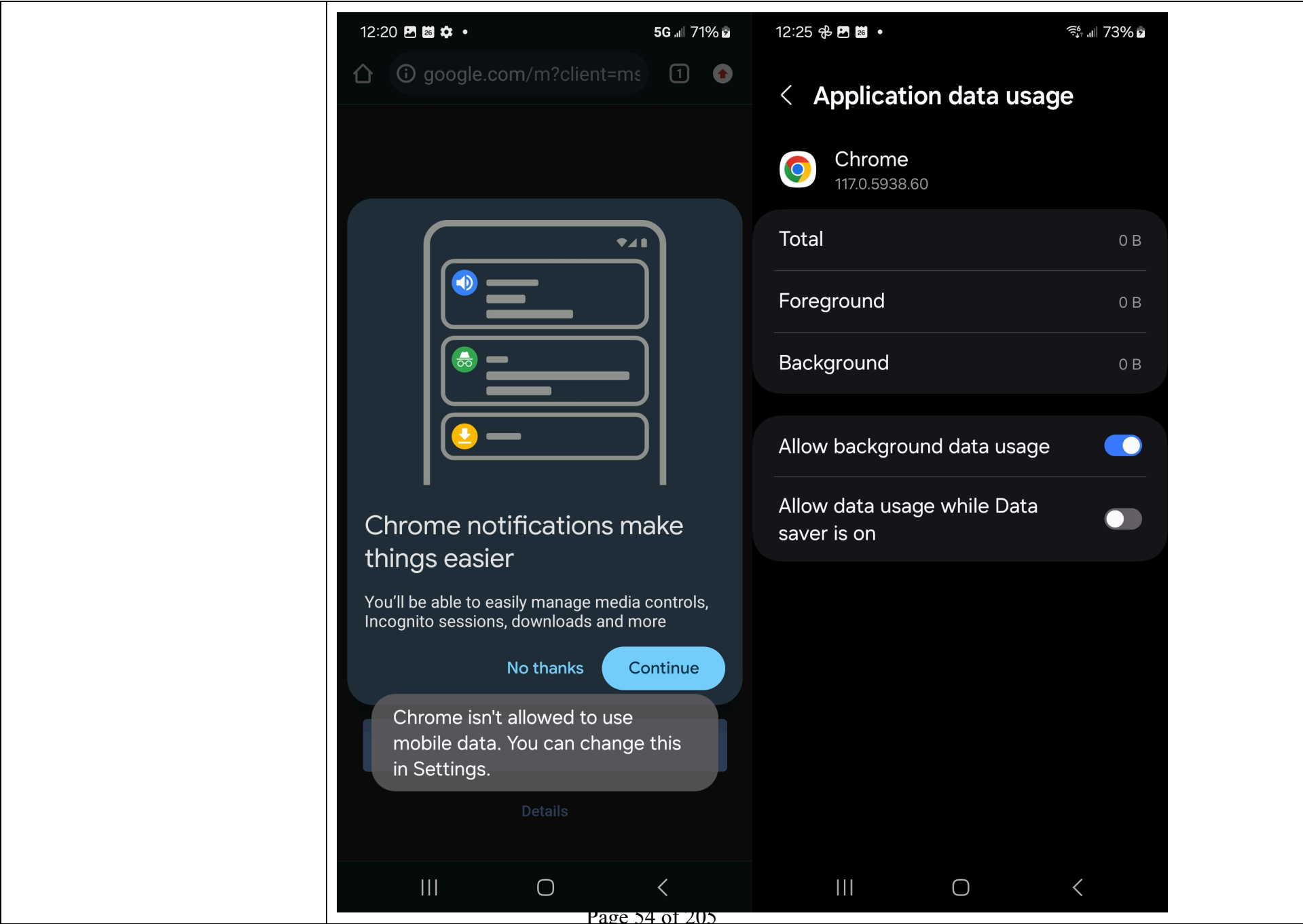
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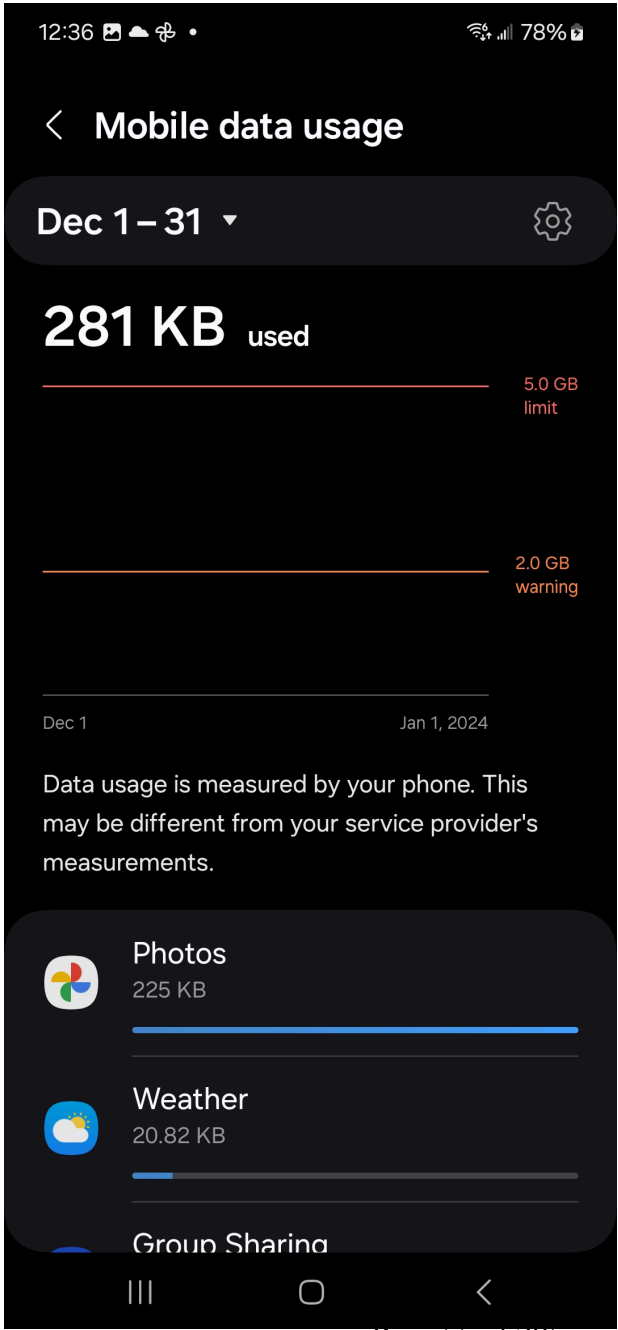
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|       | <p>As yet another example, the Accused Instrumentalities determine aspects of policies based on information from a network element. <i>See, e.g.,</i> <a href="https://www.verizon.com/plans/">https://www.verizon.com/plans/</a>:</p> <div><div><div>PersonalBusiness</div><div>StoresEspañol</div></div><div><div></div><div>ShopWhy VerizonSupport</div><div>SignInSearch</div></div><div>Have a phone you love? Get up to \$540 when you <a href="#">bring your phone</a>. OR Get iPhone 14 Pro or iPhone 14 on us. Online only. With Unlimited Ultimate. <a href="#">Shop now</a>   <a href="#">Offer Details</a></div></div> <p>Pick your perfect plan.</p> <p>Experience ultra-fast mobile and home internet plans.<br/>Plus, get special discounts to save you more.</p> <div><div><h3>Mobile plans</h3><p>Get our best plans ever, with unlimited data on all your devices.</p><div><div><div>Unlimited</div><div>Get the power of 5G Ultra Wideband with unlimited data and 10x faster speeds.<sup>1</sup></div><div>→</div></div><div><div>Prepaid</div><div>Pay before you talk, text and stream. Now including Unlimited and 5G.</div><div>→</div></div><div><div>Connected devices</div><div>Get unlimited monthly data for devices such as mobile hotspots, tablets, laptops, smartwatches and more.</div><div>→</div></div><div><div>International</div><div>Whether you're traveling the world or at home in the US, Verizon helps you stay connected.</div><div>→</div></div></div></div></div> |


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|       | <div><p>; <a href="https://www.verizon.com/business/products/plans/">https://www.verizon.com/business/products/plans/</a>:</p><div><div><div>PersonalBusiness</div><div>SupportStores</div></div><div><div>✓</div><div>MobileInternetSolutionsResourcesContact UsWhy Verizon</div><div>Log InSearch</div></div></div><div><div>Business / Products / Plans</div><div>Call Sales: 1.888.789.1223Contact sales</div></div><div><div>Plans for your business</div><div>From mobile networks to internet connectivity and cybersecurity protection, we have plans to fit your business needs.</div></div><div><div>Mobile plansFios internet plansVoice plans</div></div><div><div>Business Unlimited Mobility Plans</div><div>Our Business Unlimited plans provide mobility built for getting work done, with the 5G, data and performance your business needs.</div><div><div>View detailsOff</div></div><div><div>Business Unlimited Start 5G</div><div>Get the essentials</div><div>As low as \$30/line</div><div>Get started</div></div><div><div>Business Unlimited Plus 5G</div><div>Boost your productivity</div><div>As low as \$40/line</div><div>Get started</div></div><div><div>Business Unlimited Pro 5G</div><div>Get more of what you need</div><div>As low as \$45/line</div><div>Get started</div></div></div></div> |

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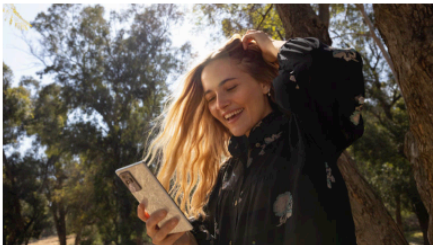



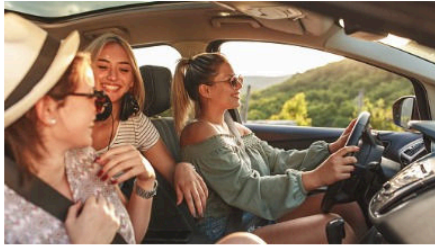
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|       | <p><a href="https://www.verizon.com/business/products/security/mobile-device-endpoint-security/mobile-device-management/mdm-device-enrollment-programs/">https://www.verizon.com/business/products/security/mobile-device-endpoint-security/mobile-device-management/mdm-device-enrollment-programs/</a>:</p> <div><div><div>PersonalBusiness</div><div>SupportStores</div></div><div><div>✓</div><div>MobileInternetSolutionsResourcesContact UsWhy Verizon</div><div>Log InSearch</div></div><div><div>Business / Products / Security &amp; Protection / Mobile Device &amp; Endpoint Security / Mobile Device Management / MDM Device Enrollment Programs</div><div>Call Sales: 1.844.994.3147</div><div>Contact sales</div></div><div><div><div>Mobile device management</div><div>Mobile device management for all your needs using My Business.</div><div>Sign up</div></div></div><p><a href="https://www.verizon.com/solutions-and-services/add-ons/safety/verizon-smart-family:">https://www.verizon.com/solutions-and-services/add-ons/safety/verizon-smart-family:</a></p></div> |

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|       | <div><div><div>PersonalBusinessLooking for Business? X</div><div>StoresEspañol</div><div><div>✓</div><div>ShopWhy VerizonSupport</div><div>Sign in</div><div>Search</div></div><div>Have a phone you love? Get up to \$540 when you <a href="#">bring your phone</a>. OR Get iPhone 14 Pro or iPhone 14 on us. Online only. With Unlimited Ultimate. <a href="#">Shop now</a>   <a href="#">Offer Details</a></div><div><div>Verizon Smart Family</div><div>OverviewFeaturesPricingSupport</div><div>Get it now</div></div><div><div><div>Peace of mind<br/>for you.<br/>Freedom for<br/>them.</div><div></div></div></div></div></div> |



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|       | <div><div><p><b>Block it Out</b></p><p>Keep certain apps and sites blocked until your kid is ready.</p></div><div><p><b>Trusted contacts only</b></p><p>Make sure they're only texting and chatting with contacts you've approved. Learn more about setting Trusted Contacts by visiting: <a href="https://www.verizon.com/support/how-to-use-verizon-smart-family/">https://www.verizon.com/support/how-to-use-verizon-smart-family/</a>.</p></div><div><p><b>Cut back screen time</b></p><p>Turn off the web during school hours, bedtime or dinner time so they can focus on what matters most.</p></div><div><p><b>Know where they are</b></p><p>Location tracking keeps tabs on your child's phone and sends alerts when they arrive at their destination.</p></div><div><p><b>Pick me up</b></p><p>Kids can request and share location with their parents.</p></div><div><p><b>View their driving or passenger activity</b></p><p>Keep your mind at ease whether your kids are on the bus, carpooling or driving.</p></div></div> <p>; <a href="https://www.verizon.com/support/knowledge-base-206963/">https://www.verizon.com/support/knowledge-base-206963/</a>; <a href="https://www.verizon.com/support/knowledge-base-152696/">https://www.verizon.com/support/knowledge-base-152696/</a>; <a href="https://www.verizon.com/support/verizon-smart-family-faqs/">https://www.verizon.com/support/verizon-smart-family-faqs/</a>;</p> |

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What Verizon Smart Family features are available without downloading the Verizon Smart Family Companion app on my child's device? 

Certain features are only available if the Verizon Smart Family Companion app is installed on your child's smartphone and paired with the Verizon Smart Family app on your device.

- **Without pairing, you can:**

- View call and text activity
- Set time restrictions on texts, calls and data usage\*
- Set data limits\*
- Set text, call and purchase limits
- Get access to the device's network location

Note: Network location accuracy may vary up to a few miles.

- **You must pair to:**

- Set content filters
- Monitor web and app activity
- Pause internet access
- Set time restrictions on Wi-Fi usage
- Locate family members and set location alerts with the best location accuracy
- Use the location check-in feature, where family members can send you their precise location when they arrive at their destination
- Use the **Pick Me Up** feature that lets your child send a request for a ride to a parent line

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|       | <p><a href="https://developer.android.com/about/versions/pie/android-9.0">https://developer.android.com/about/versions/pie/android-9.0:</a></p> <h3>Data cost sensitivity in JobScheduler</h3> <p>Beginning in Android 9, <code>JobScheduler</code> can use network status signals provided by carriers to improve the handling of network-related jobs.</p> <p>Jobs can declare their estimated data size, signal prefetching, and specify detailed network requirements. <code>JobScheduler</code> then manages work according to the network status. For example, when the network signals that it is congested, <code>JobScheduler</code> might defer large network requests. When on an unmetered network, <code>JobScheduler</code> can run prefetch jobs to improve the user experience, such as by prefetching headlines.</p> <p>When adding jobs, make sure to use <code>setEstimatedNetworkBytes()</code>, <code>setPrefetch()</code>, and <code>setRequiredNetwork()</code> when appropriate to help <code>JobScheduler</code> handle the work properly. When your job executes, be sure to use the <code>Network</code> object returned by <code>JobParameters.getNetwork()</code>. Otherwise you'll implicitly use the device's default network which may not meet your requirements, causing unintended data usage.</p> <p>; <a href="https://developer.android.com/training/basics/network-ops/reading-network-state">https://developer.android.com/training/basics/network-ops/reading-network-state</a>; <a href="https://developer.android.com/training/connectivity/network-access-optimization">https://developer.android.com/training/connectivity/network-access-optimization</a>; <a href="https://developer.android.com/reference/android/net/NetworkCapabilities">https://developer.android.com/reference/android/net/NetworkCapabilities</a>.</p> <p><i>See also, e.g.,</i> VZN-HW0000220 (and the Verizon requirements plans/documents referenced therein, as well as similar Verizon Requirement Plan(s), e.g., VZN-HW0177206; VZN-HW0175764; VZN-HW0177547; VZN-HW0175706; VZN-HW0176298; VZN-HW0174414; VZN-HW0175852; VZN-HW0175684; VZN-HW0175615; VZN-HW0177896; VZN-HW0174579; VZN-HW0176039; VZN-HW0176619; VZN-HW0175530; VZN-HW0174481; VZN-HW0176225; VZN-HW0174810; VZN-HW0177800; VZN-HW0174672; VZN-HW0175151; VZN-HW0176639; VZN-HW0174543; VZN-HW0175659; VZN-HW0176530; VZN-HW0174593; VZN-HW0178394; VZN-HW0174828; VZN-HW0175450; VZN-HW0176204; VZN-HW0176982; VZN-HW0176005; VZN-HW0175549; VZN-HW0178430; VZN-HW0176958; VZN-HW0178438; VZN-HW0176578; VZN-HW0176348; VZN-HW0175719; VZN-HW0176376; VZN-HW0175638; VZN-HW0173989; VZN-HW0168826; VZN-HW0172610; VZN-HW0170830; VZN-HW0170123; VZN-HW0170020; VZN-HW0176096; VZN-HW0173579; VZN-HW0168055; VZN-HW0173207; VZN-HW0175801; VZN-HW0171292; VZN-HW0176404; VZN-HW0169708; VZN-HW0174711; VZN-HW0171041; VZN-HW0168438; VZN-HW0169144; VZN-</p> |

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|  | <p>HW0171034; VZN-HW0176253; VZN-HW0168937; VZN-HW0178208; VZN-HW0168214; VZN-HW0177919; VZN-HW0177231; VZN-HW0170855; VZN-HW0173155; VZN-HW0169753; VZN-HW0172836; VZN-HW0178369; VZN-HW0175490; VZN-HW0170876; VZN-HW0173388; VZN-HW0175252; VZN-HW0171269; VZN-HW0177977; VZN-HW0170140; VZN-HW0171240; VZN-HW0171064; VZN-HW0171315; VZN-HW0173181; VZN-HW0168426; VZN-HW0171251; VZN-HW0177620; VZN-HW0168225; VZN-HW0177024; VZN-HW0174394; VZN-HW0176581; VZN-HW0173422; VZN-HW0171072; VZN-HW0173513; VZN-HW0174896; VZN-HW0173177; VZN-HW0168888; VZN-HW0173571; VZN-HW0168293; VZN-HW0172626; VZN-HW0168153; VZN-HW0168467; VZN-HW0172868; VZN-HW0169975; VZN-HW0176672; VZN-HW0173107; VZN-HW0169867; VZN-HW0169801; VZN-HW0170042; VZN-HW0169032; VZN-HW0172889; VZN-HW0172906; VZN-HW0174107; VZN-HW0169470; VZN-HW0168191; VZN-HW0168925; VZN-HW0168092; VZN-HW0172748; VZN-HW0172440; VZN-HW0174270; VZN-HW0172200; VZN-HW0168510; VZN-HW0173610; VZN-HW0173815; VZN-HW0170808; VZN-HW0172082; VZN-HW0173375; VZN-HW0168759; VZN-HW0171739; VZN-HW0168541; VZN-HW0169588; VZN-HW0170882; VZN-HW0172312; VZN-HW0171091; VZN-HW0173217; VZN-HW0169926; VZN-HW0169149; VZN-HW0170627; VZN-HW0170151; VZN-HW0171347).</p> |
| [1e] and if it is determined that the service usage activity is the background activity, apply the policy. | <p>The Accused Instrumentalities comprise “and if it is determined that the service usage activity is the background activity, apply the policy.”</p> <p>For example, Samsung’s devices, including the Samsung Galaxy S22, run the Android Operating System, which applies the policy to background service usage activity. <i>See, e.g.,</i> <a href="https://www.verizon.com/smartphones/samsung-galaxy-s22/">https://www.verizon.com/smartphones/samsung-galaxy-s22/</a>:</p>   |

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**Performance**

**Bluetooth**

Y, BT 5.2

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**Processor**

Snapdragon 8 Gen 1 Mobile Platform, Octa-Core, 2.99GHz, 2.4GHz, 1.7GHz

---

**Storage**

128GB/256GB (ROM) + 8GB (RAM)

---

**OS**

Android 12 (S OS)

---

**Expandable Memory**

No

---

**Hotspot**

Y, (3G : 5 devices, 4G/5G : 10 devices)





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**Security**

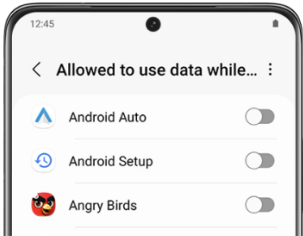
Fingerprint, face lock

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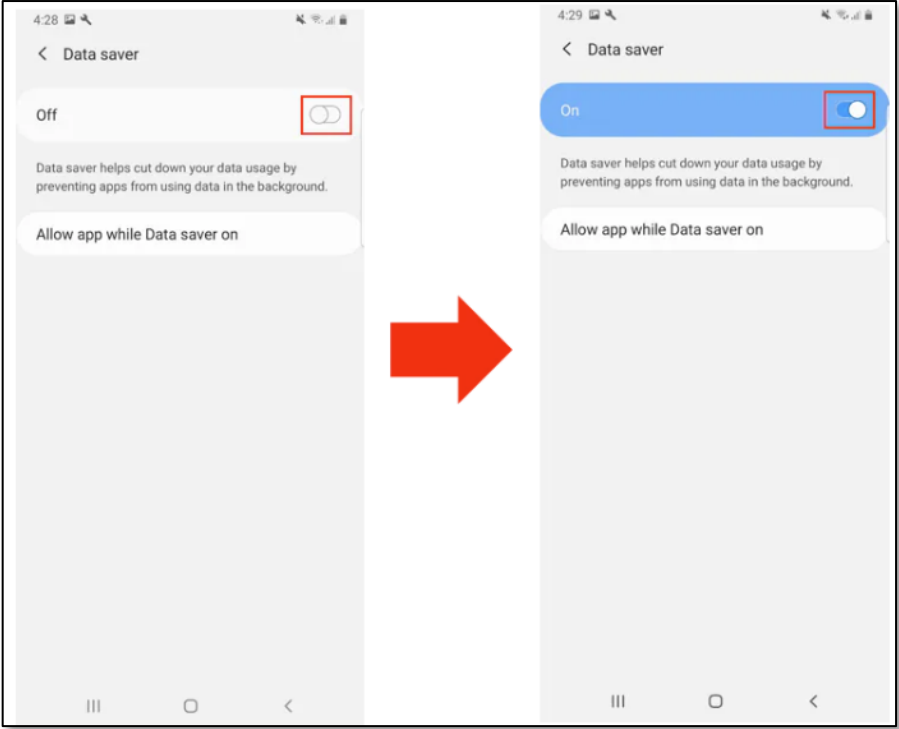
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|       | <p><a href="https://www.verizon.com/support/knowledge-base-236117/">https://www.verizon.com/support/knowledge-base-236117/</a>:</p> <div><h2>Samsung Galaxy S21 5G / Galaxy S21 Ultra 5G - Manage Data Usage</h2><div><p><b>NOTE</b></p><ul style="list-style-type: none"><li>• Data usage info provided by the device may differ from actual usage. For data usage info provided by Verizon, refer to the <a href="#">My Verizon website</a>.</li><li>•  For a better understanding of how data is used, check out this <a href="#">video</a>.</li><li>• To control data usage on your account, refer to <a href="#">Verizon Smart Family™</a>.</li></ul></div><ol style="list-style-type: none"><li>1. From a Home screen, swipe up from the center of the display to access the apps screen.<br/>→ These instructions only apply to <a href="#">Standard mode</a> and the default <a href="#">Home screen layout</a>.</li><li>2. Navigate: <b>Settings</b>  <b>Connections</b>.</li><li>3. Tap <b>Data usage</b> then do any of the following:<ul style="list-style-type: none"><li>• Turn Data saver off<ol style="list-style-type: none"><li>a. Tap <b>Data saver</b>.</li><li>b. Tap the Data saver switch to turn on  or off  .<br/>→ Data saver must be turned off to use Mobile Hotspot.</li></ol></li></ul></li></ol></div> <p>; <a href="https://www.samsung.com/us/support/answer/ANS00079018/">https://www.samsung.com/us/support/answer/ANS00079018/</a>:</p> |

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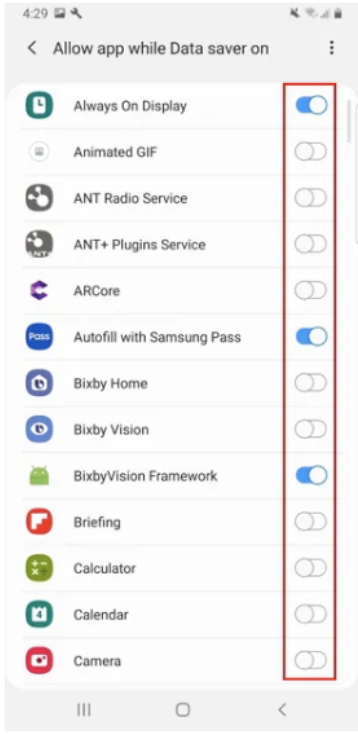
| Claim | Public Documentation  |
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|       | <div><div><div><div>Turn Data saver on or off</div><div><p>Data saver prevents some apps from sending or receiving data in the background. So rest assured, you're not wasting any precious data.</p><ol style="list-style-type: none"><li>1. Navigate to and open <b>Settings</b>, and then tap <b>Connections</b>.</li><li>2. Tap <b>Data usage</b>, tap <b>Data saver</b>, and then tap the <b>switch</b> next to Turn on now.</li><li>3. If there are still some apps you'd like to run in the background, you can set them as exceptions. Tap <b>Allowed to use data while Data saver is on</b> at the bottom of the screen.</li><li>4. Tap <b>More options</b> (the three vertical dots) and choose <b>Show system apps</b> or <b>Show allowed apps first</b> to narrow down the list.</li><li>5. Finally, tap the <b>switch(es)</b> next to your desired app(s).</li></ol></div><div></div></div></div><div><p>; <a href="https://www.samsung.com/ae/support/mobile-devices/android-pie-what-is-the-data-saver-feature/">https://www.samsung.com/ae/support/mobile-devices/android-pie-what-is-the-data-saver-feature/</a>;</p></div></div> |

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|       | <div><p>6 Toggle the switches on next to the apps that you need to receive notifications from all the time. Email, Messages, Messenger, Instagram and Facebook are all popular options to allow unrestricted data access..</p><p>The screenshot shows the 'Allow app while Data saver on' screen in a Samsung phone's settings. It lists various apps with toggle switches to their right. A red rectangular box highlights the switches for 'Always On Display', 'Bixby Vision Framework', and 'Camera'. The 'Always On Display' and 'Bixby Vision Framework' switches are turned on (blue), while the 'Camera' switch is turned off (grey). Other apps like 'Animated GIF', 'ANT Radio Service', 'ANT+ Plugins Service', 'ARCore', 'Autofill with Samsung Pass', 'Bixby Home', 'Bixby Vision', 'Briefing', 'Calculator', and 'Calendar' have their switches turned off.</p><p>; <a href="https://www.samsung.com/us/support/answer/ANS00078987/">https://www.samsung.com/us/support/answer/ANS00078987/</a>:</p></div> |

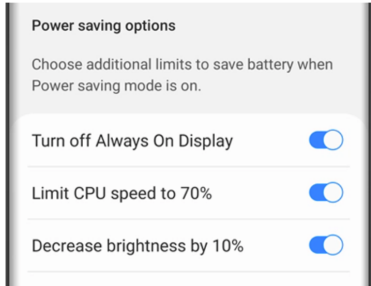
## Power saving mode

**Note:** Using Power saving mode can affect app and device performance. Some tasks and features may take longer to complete or update. Additionally, apps running in the background may not receive updates or send you notifications when Power saving mode is enabled.

Before you turn in for the night, change your phone's power mode. This will decrease your phone's performance and save battery life.

1. Navigate to and open **Settings**, and then tap **Battery and device care**.
2. Tap **Battery**, and then tap **Power saving**.
3. Tap the **switches** next to your desired settings or customizations.
4. Finally, tap the **switch** at the top of the screen to activate Power saving mode.

You will not be able to adjust the settings once the mode is enabled. If you want to change any of the settings, you'll need to temporarily disable Power saving mode.



The screenshot shows the 'Power saving options' screen. At the top, it says 'Choose additional limits to save battery when Power saving mode is on.' Below this are three settings, each with a toggle switch that is currently turned on (blue): 'Turn off Always On Display', 'Limit CPU speed to 70%', and 'Decrease brightness by 10%'.

; <https://developer.android.com/training/basics/network-ops/data-saver>:

## Optimize network data usage

Over the life of a smartphone, the cost of a cellular data plan can easily exceed the cost of the device itself. On Android 7.0 (API level 24) and higher, users can enable Data Saver on a device-wide basis in order to optimize their device's data usage, and use less data. This ability is especially useful when roaming, near the end of the billing cycle, or for a small prepaid data pack.

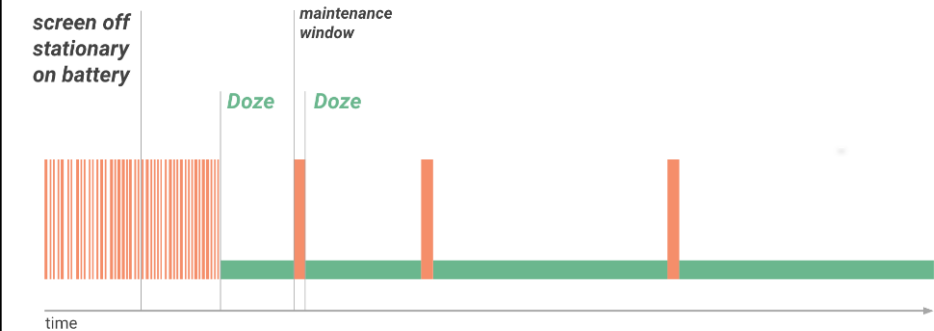
When a user enables Data Saver in **Settings** and the device is on a metered network, the system blocks background data usage and signals apps to use less data in the foreground wherever possible. Users can allow specific apps to use background metered data usage even when Data Saver is turned on.

Android 7.0 (API level 24) extends the `ConnectivityManager` API to provide apps with a way to [retrieve the user's Data Saver preferences](#) and [monitor preference changes](#). It is considered good practice for apps to check whether the user has enabled Data Saver and make an effort to limit foreground and background data usage.

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|       | <div><p><b>Check data saver preferences</b></p><p>On Android 7.0 (API level 24) and higher, apps can use the <code>ConnectivityManager</code> API to determine what data usage restrictions are being applied. The <code>getRestrictBackgroundStatus()</code> method returns one of the following values:</p><p><code>RESTRICT_BACKGROUND_STATUS_DISABLED</code></p><p>Data Saver is disabled.</p><p><code>RESTRICT_BACKGROUND_STATUS_ENABLED</code></p><p>The user has enabled Data Saver for this app. Apps should make an effort to limit data usage in the foreground and gracefully handle restrictions to background data usage.</p><p><code>RESTRICT_BACKGROUND_STATUS_WHITELISTED</code></p><p>The user has enabled Data Saver but the app is allowed to bypass it. Apps should still make an effort to limit foreground and background data usage.</p><p>Limit data usage whenever the device is connected to a metered network, even if Data Saver is disabled or the app is allowed to bypass it. The following sample code uses <code>ConnectivityManager.isActiveNetworkMetered()</code> and <code>ConnectivityManager.getRestrictBackgroundStatus()</code> to determine how much data the app should use:</p></div> <p>; <a href="https://developer.android.com/training/monitoring-device-state/doze-standby">https://developer.android.com/training/monitoring-device-state/doze-standby</a>:</p> <div><p><b>Optimize for Doze and App Standby</b></p><p>Starting from Android 6.0 (API level 23), Android introduces two power-saving features that extend battery life for users by managing how apps behave when a device is not connected to a power source. <i>Doze</i> reduces battery consumption by deferring background CPU and network activity for apps when the device is unused for long periods of time. <i>App Standby</i> defers background network activity for apps with which the user has not recently interacted.</p><p>While the device is in Doze, apps' access to certain battery-intensive resources is deferred until maintenance windows. The specific restrictions are listed in <a href="#">Power Management Restrictions</a>.</p><p>Doze and App Standby manage the behavior of all apps running on Android 6.0 or higher, regardless whether they are specifically targeting API level 23. To ensure the best experience for users, test your app in Doze and App Standby modes and make any necessary adjustments to your code. The sections below provide details.</p></div> |

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|       | <div><p><b>Understanding Doze</b></p><p>If a user leaves a device unplugged and stationary for a period of time, with the screen off, the device enters Doze mode. In Doze mode, the system attempts to conserve battery by restricting apps’ access to network and CPU-intensive services. It also prevents apps from accessing the network and defers their jobs, syncs, and standard alarms.</p><p>Periodically, the system exits Doze for a brief time to let apps complete their deferred activities. During this <i>maintenance window</i>, the system runs all pending syncs, jobs, and alarms, and lets apps access the network.</p></div> <div><p><b>Figure 1.</b> Doze provides a recurring maintenance window for apps to use the network and handle pending activities.</p></div> <div><p>At the conclusion of each maintenance window, the system again enters Doze, suspending network access and deferring jobs, syncs, and alarms. Over time, the system schedules maintenance windows less and less frequently, helping to reduce battery consumption in cases of longer-term inactivity when the device is not connected to a charger.</p><p>As soon as the user wakes the device by moving it, turning on the screen, or connecting a charger, the system exits Doze and all apps return to normal activity.</p></div> <div><p>The Doze restriction on network access is also likely to affect your app, especially if the app relies on real-time messages such as tickles or notifications. If your app requires a persistent connection to the network to receive messages, you should use <a href="#">Firebase Cloud Messaging (FCM)</a> if possible.</p></div> <div><p>; <a href="https://developer.android.com/topic/performance/appstandby">https://developer.android.com/topic/performance/appstandby</a>:</p></div> |

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## App Standby Buckets

Android 9 (API level 28) and higher support **App Standby Buckets**. App Standby Buckets help the system prioritize apps' requests for resources based on how recently and how frequently the apps are used. Based on app usage patterns, each app is placed in one of five priority **buckets**. The system limits the device resources available to each app based on which bucket the app is in.

### Priority buckets

The system dynamically assigns each app to a priority bucket, reassigning the apps as needed. The system may rely on a preloaded app that uses machine learning to determine how likely each app is to be used, and assigns apps to the appropriate buckets. If the system app is not present on a device, the system defaults to sorting apps based on how recently they were used. More active apps are assigned to buckets that give the apps higher priority, making more system resources available to the app. In particular, the bucket determines how frequently the app's jobs run, and how often the app can trigger alarms. These restrictions apply only while the device is on battery power; the system does not impose these restrictions on apps while the device is charging.


★ **Note:** Every manufacturer can set their own criteria for how non-active apps are assigned to buckets. You should not try to influence which bucket your app is assigned to. Instead, focus on making sure your app behaves well in whatever bucket it might be in. Your app can find out what bucket it's currently in by calling [`UsageStatsManager.getAppStandbyBucket\(\)`](#).

The buckets are:

1. **Active:** App is currently being used or was very recently used.
2. **Working set:** App is in regular use.
3. **Frequent:** App is often used, but not every day.
4. **Rare:** App is not frequently used.
5. **Restricted:** App consumes a great deal of system resources, or may exhibit undesirable behavior.

In addition, there's a special **never** bucket for apps that have been installed but have never been run. The system imposes severe restrictions on these apps.

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|       | <p>; <a href="https://developer.android.com/topic/performance/power/power-details">https://developer.android.com/topic/performance/power/power-details</a>:</p> <h2>Power management restrictions </h2> <p>As described in <a href="#">Power management</a>, the system can impose power restrictions on apps for a number of reasons. The following table outlines the current restrictions. These restrictions do not apply while the device is charging.</p> <p>In each case, the most restrictive applicable setting is the one that takes effect. For example, if Battery Saver is active and an app is in the Rare bucket, the more stringent App Standby Buckets restrictions on Firebase Cloud Messaging (FCM) are applied.</p> |

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| Setting                            | Jobs *                               | Alarms   | Network †          | Firebase Cloud Messaging §   |
|------------------------------------|--------------------------------------|--|--------------------|--|
| User Restricts Background Activity |                                      |  |                    |  |
| Restrictions enabled:              | Never                                | Never  | No restriction     | No restriction   |
| Doze                               |                                      |  |                    |  |
| Doze active:                       | Deferred to window                   | Regular alarms: Deferred to window<br><br>Inexact while-idle alarms: Limited to 1 per 9 minutes<br><br>Exact while-idle alarms: Limited to 72 per hour | Deferred to window | High priority: No restriction<br><br>Normal priority: Deferred to window |
| App Standby Buckets (by bucket)    |                                      |  |                    | Prior to Android 13 (API Level 33)                                       |
| Active:                            | No restriction                       | No restriction   | No restriction     | No restriction   |
| Working set:                       | Limited to 10 minutes every 2 hours  | Limited to 10 per hour   | No restriction     | No restriction   |
| Frequent:                          | Limited to 10 minutes every 8 hours  | Limited to 2 per hour  | No restriction     | High priority: 10/day  |
| Rare:                              | Limited to 10 minutes every 24 hours | Limited to 1 per hour  | Disabled           | High priority: 5/day   |
| Restricted:                        | Once per day                         | One alarm per day, either an <a href="#">exact alarm</a> or an <a href="#">inexact alarm</a>   | Disabled           | High priority: 5/day   |
| Page 74 of 205                     |                                      |  |                    |  |

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|       | ; <a href="https://developer.android.com/topic/performance/background-optimization">https://developer.android.com/topic/performance/background-optimization</a> ; <a href="https://developer.android.com/reference/android/app/job/JobScheduler">https://developer.android.com/reference/android/app/job/JobScheduler</a> ; <a href="https://developer.android.com/guide/background/persistent">https://developer.android.com/guide/background/persistent</a> ; <a href="https://developer.android.com/guide/components/activities/activity-lifecycle">https://developer.android.com/guide/components/activities/activity-lifecycle</a> : |



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## Activity-lifecycle concepts

To navigate transitions between stages of the activity lifecycle, the `Activity` class provides a core set of six callbacks: `onCreate()`, `onStart()`, `onResume()`, `onPause()`, `onStop()`, and `onDestroy()`. The system invokes each of these callbacks as the activity enters a new state.

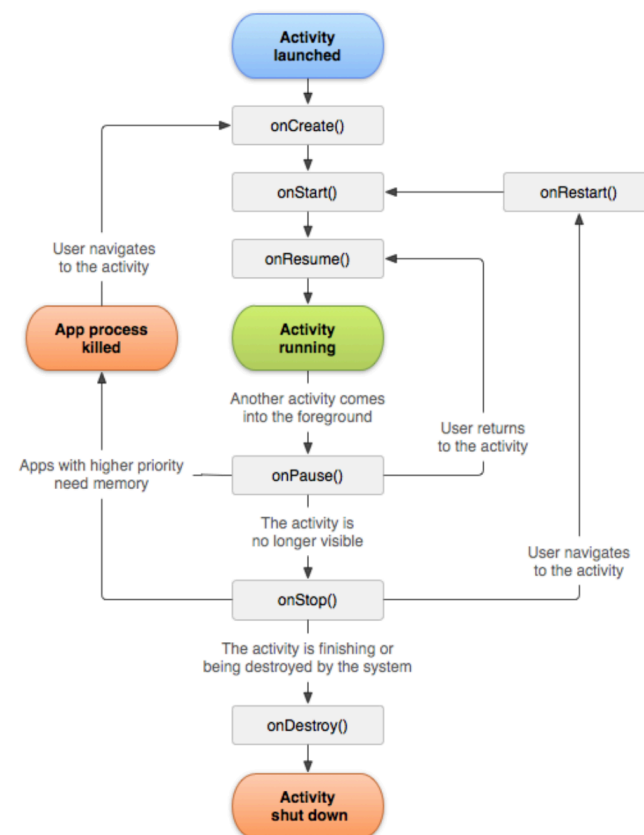
Figure 1 presents a visual representation of this paradigm.

As the user begins to leave the activity, the system calls methods to dismantle the activity. In some cases, the activity is only partially dismantled and still resides in memory, such as when the user switches to another app. In these cases, the activity can still come back to the foreground.

If the user returns to the activity, it resumes from where the user left off. With a few exceptions, apps are [restricted from starting activities when running in the background](#).

The system’s likelihood of killing a given process, along with the activities in it, depends on the state of the activity at the time. For more information on the relationship between state and vulnerability to ejection, see the section about [activity state and ejection from memory](#).

Depending on the complexity of your activity, you probably don’t need to implement all the lifecycle methods. However, it’s important that you understand each one and implement those that make your app behave the way users expect.

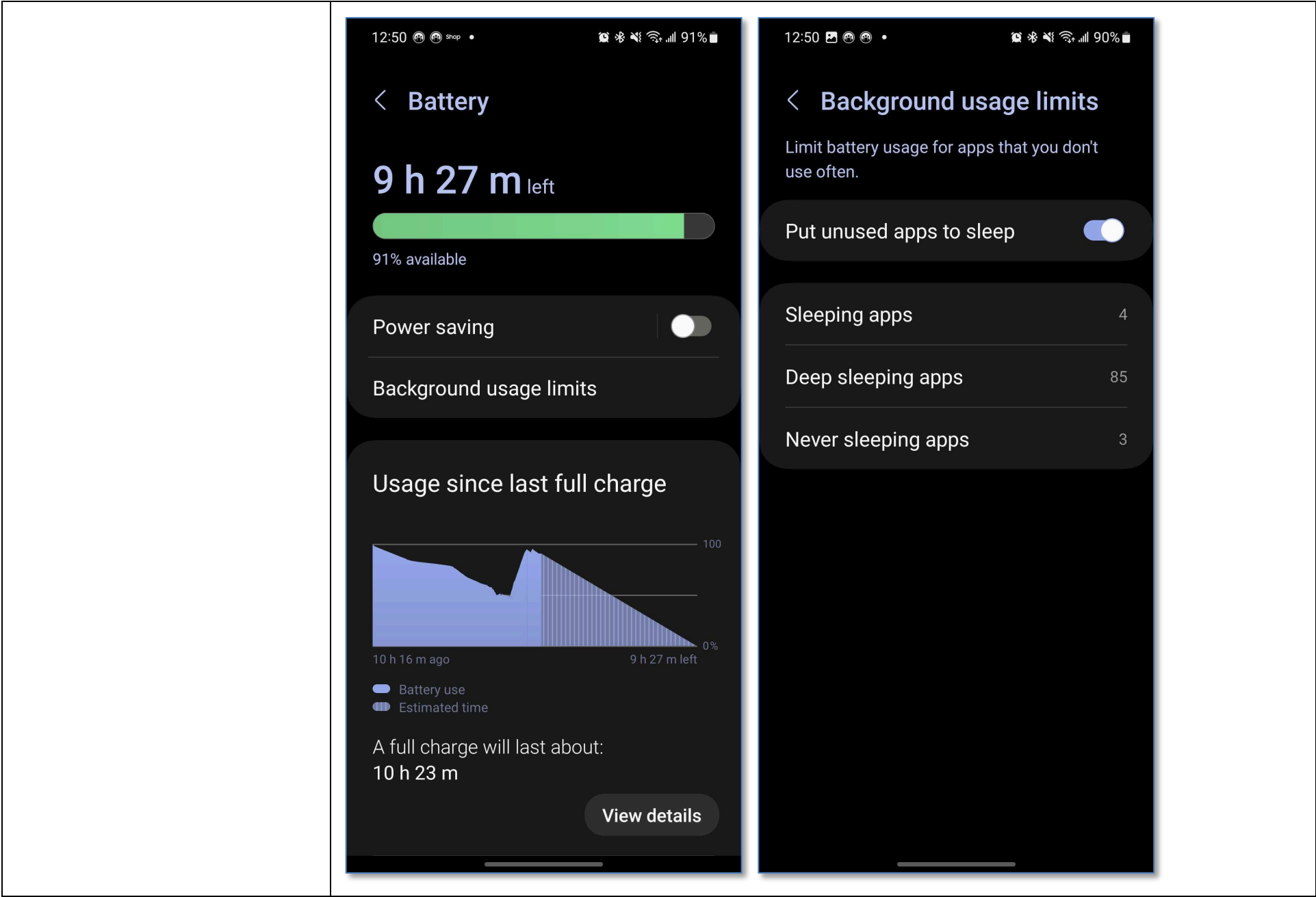


**Figure 1.** A simplified illustration of the activity lifecycle.

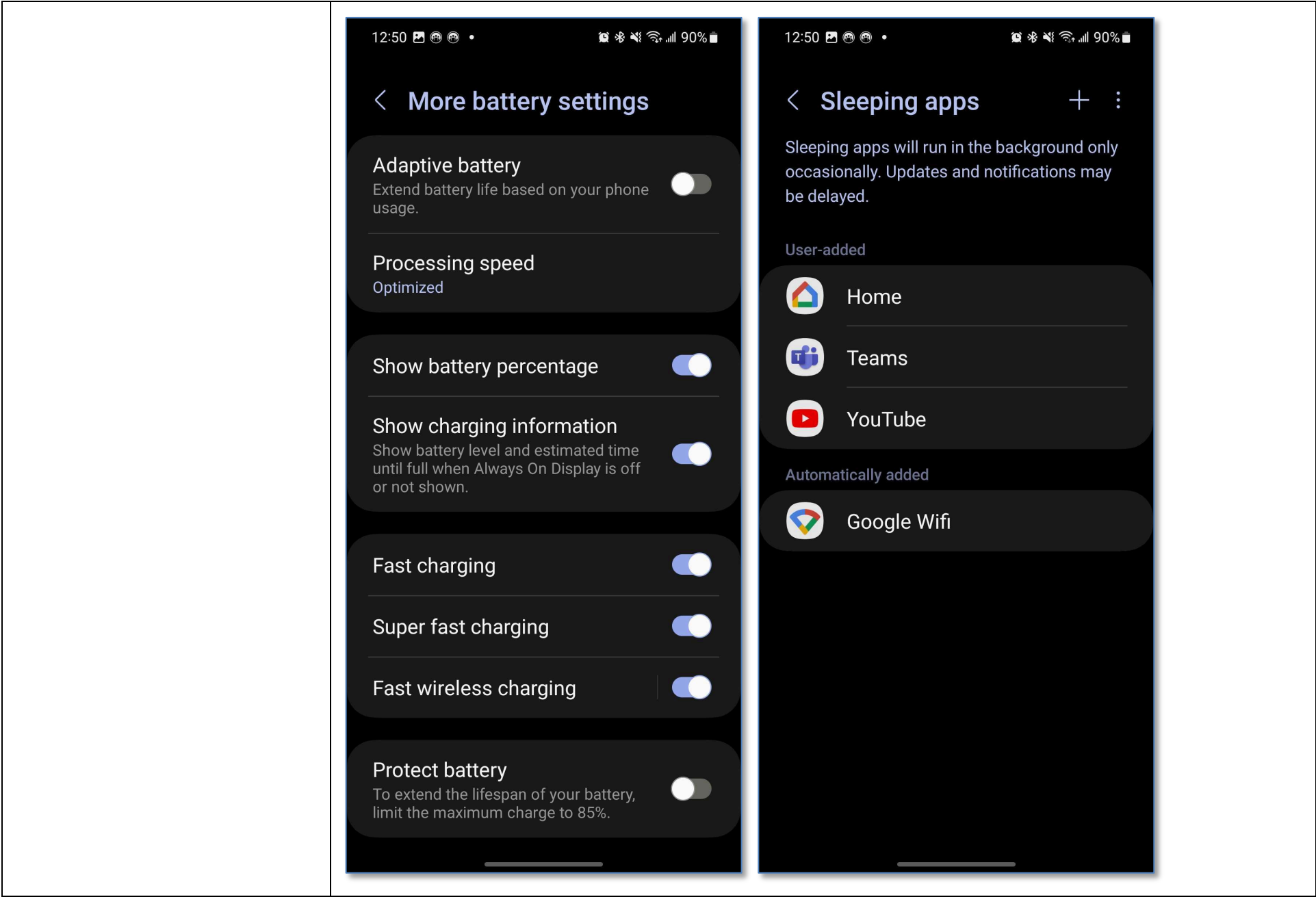
**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

| Claim | Public Documentation  |
|-------|---|
|       | <p>; <a href="https://developer.android.com/guide/components/activities/process-lifecycle">https://developer.android.com/guide/components/activities/process-lifecycle</a>; <a href="https://developer.android.com/guide/background">https://developer.android.com/guide/background</a>; <a href="https://developer.android.com/about/versions/pie/android-9.0">https://developer.android.com/about/versions/pie/android-9.0</a>; <a href="https://developer.android.com/training/basics/network-ops/reading-network-state">https://developer.android.com/training/basics/network-ops/reading-network-state</a>; <a href="https://developer.android.com/training/connectivity/network-access-optimization">https://developer.android.com/training/connectivity/network-access-optimization</a>; <a href="https://developer.android.com/reference/android/net/NetworkCapabilities">https://developer.android.com/reference/android/net/NetworkCapabilities</a>. <i>see also</i> the exemplary screenshots below:</p> |

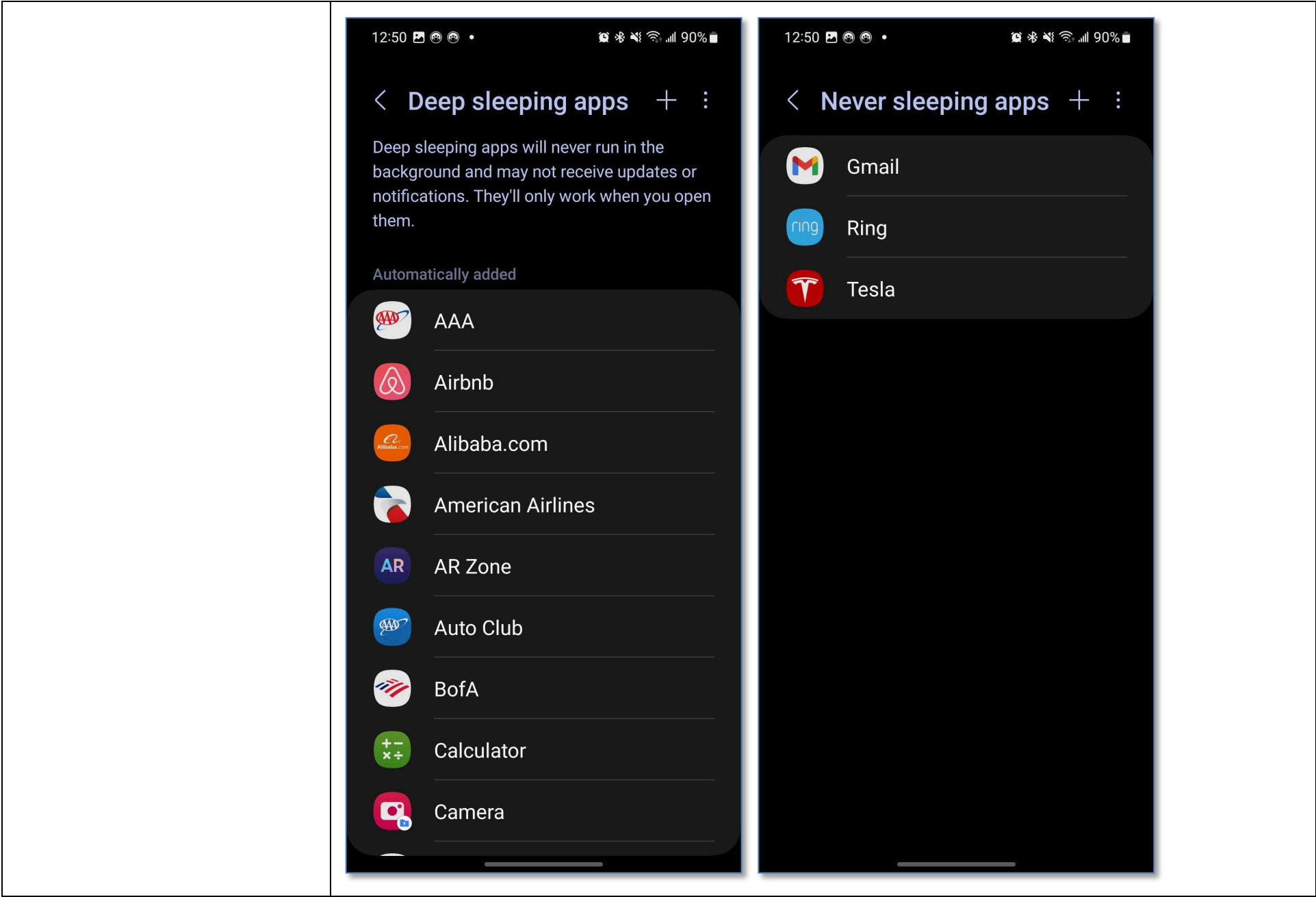
HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY



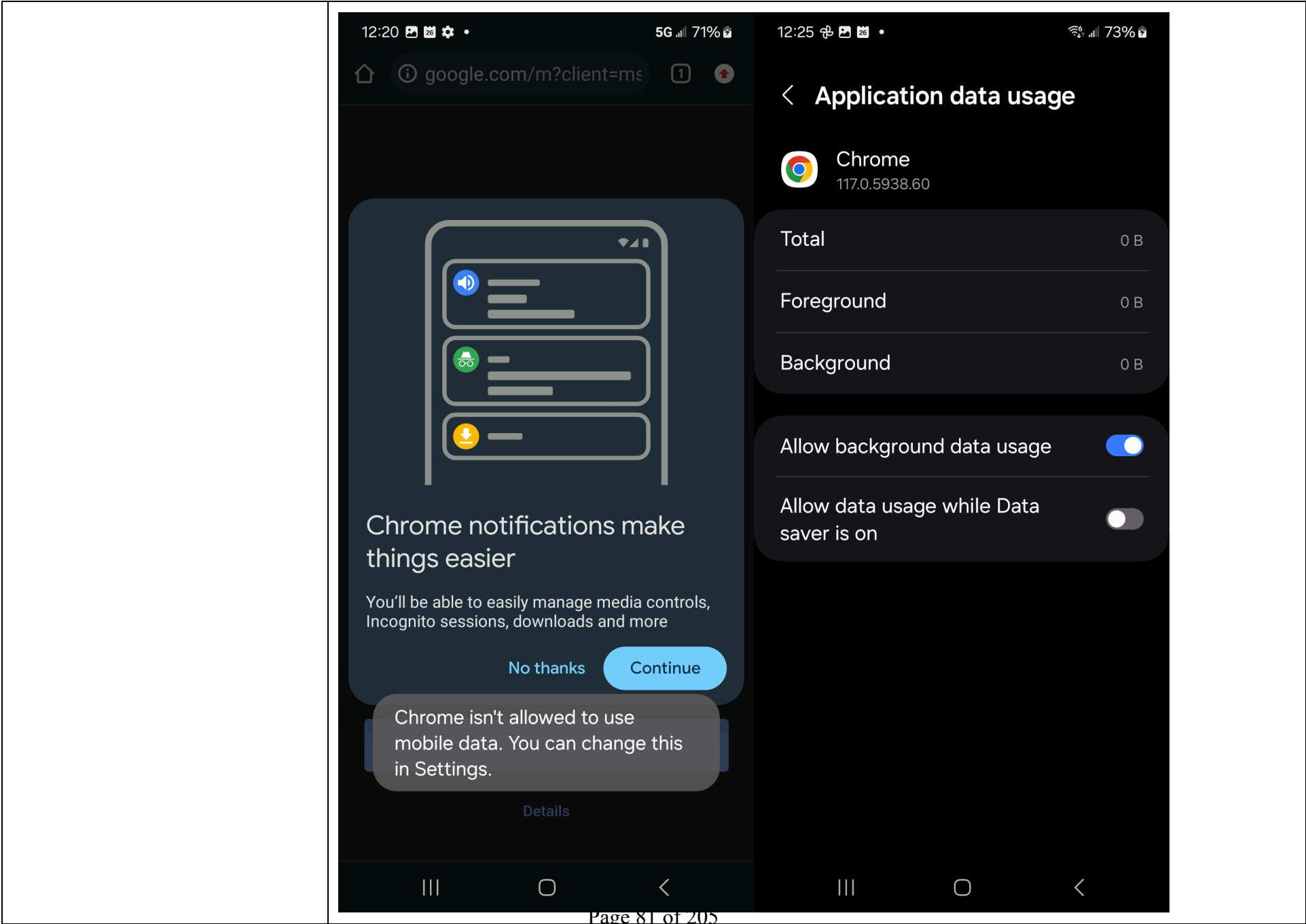
**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**



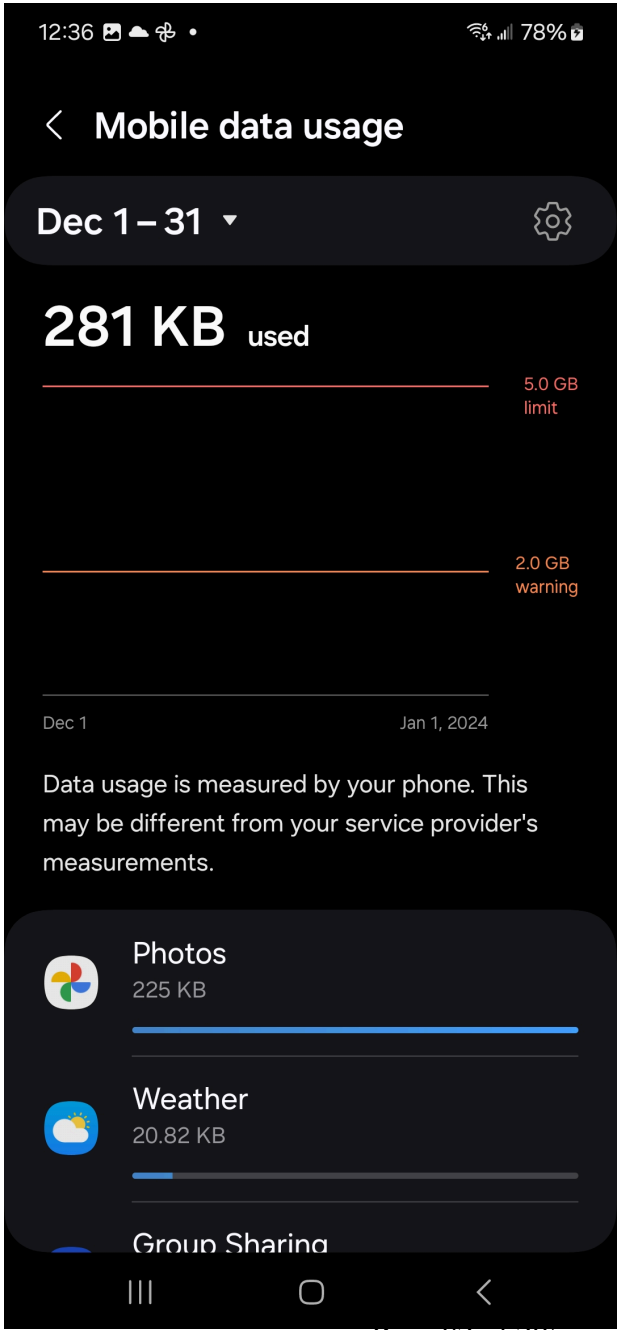
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| Claim | Public Documentation  |
|-------|---|
|       | <p>; <i>see also</i>, e.g., <a href="https://www.verizon.com/plans/">https://www.verizon.com/plans/</a>; <a href="https://www.verizon.com/business/products/plans/">https://www.verizon.com/business/products/plans/</a>; <a href="https://www.verizon.com/business/products/security/mobile-device-endpoint-security/mobile-device-management/mdm-device-enrollment-programs/">https://www.verizon.com/business/products/security/mobile-device-endpoint-security/mobile-device-management/mdm-device-enrollment-programs/</a>; <a href="https://www.verizon.com/solutions-and-services/add-ons/safety/verizon-smart-family/">https://www.verizon.com/solutions-and-services/add-ons/safety/verizon-smart-family/</a>; <a href="https://www.verizon.com/support/knowledge-base-206963/">https://www.verizon.com/support/knowledge-base-206963/</a>; <a href="https://www.verizon.com/support/knowledge-base-152696/">https://www.verizon.com/support/knowledge-base-152696/</a>; <a href="https://www.verizon.com/support/verizon-smart-family-faqs/">https://www.verizon.com/support/verizon-smart-family-faqs/</a>.</p> <p><i>See also</i>, e.g., VZN-HW0000220 (and the Verizon requirements plans/documents referenced therein, as well as similar Verizon Requirement Plan(s), e.g., VZN-HW0177206; VZN-HW0175764; VZN-HW0177547; VZN-HW0175706; VZN-HW0176298; VZN-HW0174414; VZN-HW0175852; VZN-HW0175684; VZN-HW0175615; VZN-HW0177896; VZN-HW0174579; VZN-HW0176039; VZN-HW0176619; VZN-HW0175530; VZN-HW0174481; VZN-HW0176225; VZN-HW0174810; VZN-HW0177800; VZN-HW0174672; VZN-HW0175151; VZN-HW0176639; VZN-HW0174543; VZN-HW0175659; VZN-HW0176530; VZN-HW0174593; VZN-HW0178394; VZN-HW0174828; VZN-HW0175450; VZN-HW0176204; VZN-HW0176982; VZN-HW0176005; VZN-HW0175549; VZN-HW0178430; VZN-HW0176958; VZN-HW0178438; VZN-HW0176578; VZN-HW0176348; VZN-HW0175719; VZN-HW0176376; VZN-HW0175638; VZN-HW0173989; VZN-HW0168826; VZN-HW0172610; VZN-HW0170830; VZN-HW0170123; VZN-HW0170020; VZN-HW0176096; VZN-HW0173579; VZN-HW0168055; VZN-HW0173207; VZN-HW0175801; VZN-HW0171292; VZN-HW0176404; VZN-HW0169708; VZN-HW0174711; VZN-HW0171041; VZN-HW0168438; VZN-HW0169144; VZN-HW0171034; VZN-HW0176253; VZN-HW0168937; VZN-HW0178208; VZN-HW0168214; VZN-HW0177919; VZN-HW0177231; VZN-HW0170855; VZN-HW0173155; VZN-HW0169753; VZN-HW0172836; VZN-HW0178369; VZN-HW0175490; VZN-HW0170876; VZN-HW0173388; VZN-HW0175252; VZN-HW0171269; VZN-HW0177977; VZN-HW0170140; VZN-HW0171240; VZN-HW0171064; VZN-HW0171315; VZN-HW0173181; VZN-HW0168426; VZN-HW0171251; VZN-HW0177620; VZN-HW0168225; VZN-HW0177024; VZN-HW0174394; VZN-HW0176581; VZN-HW0173422; VZN-HW0171072; VZN-HW0173513; VZN-HW0174896; VZN-HW0173177; VZN-HW0168888; VZN-HW0173571; VZN-HW0168293; VZN-HW0172626; VZN-HW0168153; VZN-HW0168467; VZN-HW0172868; VZN-HW0169975; VZN-HW0176672; VZN-HW0173107; VZN-HW0169867; VZN-HW0169801; VZN-HW0170042; VZN-HW0169032; VZN-HW0172889; VZN-HW0172906; VZN-HW0174107; VZN-HW0169470; VZN-HW0168191; VZN-HW0168925; VZN-HW0168092; VZN-HW0172748; VZN-HW0172440; VZN-HW0174270; VZN-HW0172200; VZN-</p> |